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News

All that's new in the ever expanding world of the Electron. **5**

MicroLink News

A monthly update on the increasing potential of Britain's national on-line database. **7**

Graphics

How to tidy up your MOVEs and DRAWs, and add colour to them while you're at it. **8**

Discs

How to use the disc system to give you extra star commands. **10**

Software Surgery

The latest software releases reviewed. Bullseye, Tennis, Ian Botham's Test Match and Jet Set Willy - they're all here. **13**

Attributes

This colourful two player strategy game will provide hours of fun for the whole family. **17**

Hardware

Want to supercharge your Electron? The Elk Turbo-Driver from Slogger may give you the speed you've been looking for. **22**

Extra Commands

This fascinating series comes to an end as we provide your micro with a WHILE ... WEND command. **26**



Royal Wedding

Whether you're new to sliding block puzzles or not you'll have hours of fun with this program to celebrate the most exciting royal event of the year. **34**



Snapdragon

Enjoy this two player version of the classic card game. It uses your Electron's graphics capabilities to the full. **29**

Osword

In the last part of the series we look at the calls that deal with the internal elapsed time clock and the interval timer. **41**

Beginners

In the battle against the dreaded GOTO, subroutines can be a vital tool. This is how to use them. **44**

Micro Messages

The pages you write yourselves. A selection from the many interesting letters you've been sending us over the last few weeks. **47**

Formatter

Make your listings easier to read with this utility to split multi-statement lines. **55**



Merlin

More hints and tips for adventurers from our resident wizard. **56**

Education

We take a look at a variety of software including arcade games and adventures and discuss its role in a teaching environment. **59**

Bargains galore!

Don't miss our special offers on Pages 50 to 53.

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electron user NEWS

Electron sales top at big Show

WITHIN an hour of the doors being opened for the spring Electron & BBC Micro User Show, the scene was set to break not one but four records – thanks in no small part to the Electron.

At that time the turnstiles were temporarily closed because of the volume of people flooding into the New Horticultural Hall.

It was a situation repeated on several occasions during the three day event which attracted more than 16,000 visitors, an all-time high.

The first day alone saw more than 5,000 enthusiasts converge on the exhibition – the largest number ever during a weekday.

Yet another record fell when it was assessed that more than £1,200,000 worth of business had been achieved at the show, beating the previous best by £200,000.

Nor were the smiles confined to the faces of exhibitors. A survey of stands showed more than 500 special offers on display – close to 100 in excess of the former record.

"It was just fantas-

tic", reported John Huddleston of Advanced Computer Products, a leading supplier to the Electron market.

"We took more on the first morning than we did for any of the previous shows. In fact we sold out of our new AP4 interface for the Electron by noon that day.

"The only trouble is having exhibited at the

last few shows, I'm now running out of superlatives to describe them".

He went on to point out that interest in the Electron demonstrated at the show now far outweighed that in the BBC Micro.

"Even though obviously a lot of people had come to see the new Master 128, even that was pushed into second place in the popularity



Electron fans packed the Show

stakes by the Electron.

"In fact although we sell add ons for all three machines, Electron sales surpassed those of the other two quite easily".

A similar story was to be heard around the show with exhibitors revealing that products

for the Electron were outselling those for the BBC Micro by three to one.

Companies in the Electron market are really reaping the benefits at the moment", Bob Simpson of Micro Power told *Electron User*.

MORE IN SCHOOLS

A SURVEY has shown that Electrons are becoming increasingly popular in classrooms across the country.

Schools short of funds are eagerly seizing on the cut-price machine to provide support for their complement of BBC Micros.

What is attracting the teachers is that by combining the Electron with the new AP4 disc interface they have a package with many of the BBC Micro and Master

features. "And what is most important is that you get all this for well under £200", explained Ken Gill, a Birmingham schoolmaster.

The AP4 interface from Advanced Computer Products is fully Acorn compatible, running 1770 DFS at &E00.

As a result, it enables more tape software to be run from disc, does not use up any of the RAM inside the machine, and allows the user to access

compatible BBC disc-based software.

Officially launched at the Electron & BBC Micro User Show, there was a heavy demand there for the innovation – particularly from teachers.

"They were beating their way over to our stand in droves", says John Huddleston of ACP, "for they see that this combined with the Electron provides the first true cheap alternative to the BBC Micro".

Budget boom

THE fight for the rapidly growing budget-priced games software market has intensified – with Electron users the first to benefit.

Artic has now spearheaded a drive in the budget market with its first two releases for the Electron.

Charles Cecil, a director of Artic, said: "We have had good sales even before our publicity drive. If they continue we will respond with two new titles every four to six weeks".

The two games for the Electron – Woks and The Great Wall – cost £1.99 each.

Enthar Seven coming

A MODE 6 version of Robico's disc-only adventure Enthar Seven is soon to be launched for the Electron.

The game currently only runs on a disc-based BBC B, B+ or Master. It features 450 locations, more than 130k of text and an advanced command line interpreter to bring the science fiction package to life.

However Robico has now used the Advanced Computer Products 1770 DFS, which is Acorn DFS compatible and leaves enough of the Electron's memory left for the adventure.

The Electron version will be identical to the BBC version with the exceptions that there will be no colour option for text and the @BUFFSAVE and @BUFFLOAD commands which save and load a game to and from memory will be omitted.

Enthar Seven will cost £17.95 on twin disc 40 track and £16.95 on single disc 80 track.

Meanwhile Robico has completed the storyline for the third and final part of the Rick Hanson trilogy.

ACORN MAY RE-RELEASE DORMANT SOFTWARE

IN the wake of the continuing boom in Electron software sales, Acorn is currently considering re-releasing dormant titles.

Discussions are being held with Greyhound Distribution, the company which recently acquired the rights to all the Electron titles produced by Acornsoft.

At that time up to 100 programs were involved, among them the best seller Elite, a number of utilities including View and Viewsheet, a host of educational software and languages such as Pascal and Logo.

In all around 100,000 units were bought by Greyhound,



TROPHIES and a weekend in London were the prizes for the five-strong Micro Power telesales team from Leeds for beating their targets for Electron software. But it wasn't all fun. They had to roll up their sleeves on the company's stand at the Electron and BBC Micro User Show while they were down there.

but such has been the demand since that time that many of the best known programs will soon be out of stock.

"That is why we are currently discussing with Acorn the question of re-issuing titles", Bob Simpson of Greyhound

told *Electron User*.

"In effect it will mean putting back into production a number of programs".

Greyhound's parent company - Micro Power of Leeds - has been responsible for marketing the Acornsoft product primarily via mail order.

"And it has gone extremely well - even better than we hoped", says Bob Simpson. "But the same could be said for most companies offering Electron software I imagine. For the people who stayed in this market are reaping the benefits.

"It proves our confidence in this market was well-founded.



Electron boom in Indonesia

THE Electron is in the forefront of a home computer boom in far-away Indonesia.

But there's a danger that the machine's successful marketing drive could run out of steam due to a shortage of peripherals and spare parts.

Regular reader Wibowo Soelistyo, who runs a computer shop in Semarang, wrote to ask for *Electron User's* help in ensuring that supplies don't dry up completely.

He sent a sheaf of photographs to show how popular the Electron stand was at a recent computer exhibition in Indonesia.

Now he wants UK suppliers of Electron products to help him service the growing

number of Electron owners in his country.

"As an Electron dealer I have sold many of these machines", Wibowo wrote. "We also have a workshop and technicians to service Electrons, but we find great difficulty in getting spare parts such as the RF modulator, keyboard cable connector and others.

"I would be grateful to hear of anyone in the UK who could supply us with spare parts, software and other products for Electron expansions".

Wibowo Soelistyo can be contacted at Gemah Permata Computer Shop, Pusat Per-tokoan, Lima Blok H No. 5, Semarang 50241, Indonesia.

More speed, memory

A NEW 6502 second processor from Permanent Memory Systems, the PMS-E2P, is claimed to make the Electron as powerful as the BBC Micro.

It plugs into the Plus 1 to give more usable RAM and faster program execution. It has 64k of RAM on board and 60k is available for machine code program and data.

The company says PMS-E2P will run

Prolog, Lisp, Iso-Pascal, Comal, Ultracalc and Turtle Graphics with significant increases in speed and memory in addition to more popular languages like Basic and View.

The device uses a 6502A processor running at 2MHz and PMS says the standard benchmark timings show it is on a par with the BBC Micro in all modes.

Programs which

involve graphics manipulation show even larger speed increases.

The add-on requires no modifications to the Electron and is compatible with the Plus 3 and Cumana disc interfaces.

The PMS-E2P follows the Acorn Tube protocols and all software written to these standards will operate correctly, says the company. The price will be £89.



MicroLink for import export organisation

ONE of Britain's leading import-export organisations has chosen MicroLink as the communications medium for its near 10,000 members around the world.

The prestigious British & Overseas Institute of Import Export Traders is a totally non-profit association run solely by its members who volunteer for election as officers.

It was founded in 1972 by a group of small companies and individuals who pooled their resources and knowledge to start a joint export sales drive to promote their respective products in Europe.

From this small beginning the Institute has grown to be a highly respected organisation with members all over the world.

"As its main function is to bring exporters into contact with overseas importers, it is a logical progression to require a quick and efficient standard means of communication", a spokesman said.

"As a result of this requirement the products and services committee of the Institute recommended all members to start using electronic mail".

Bill Vickerman, chairman, and Bob Pinder, senior

exports consultant - both based in Liverpool and already MicroLink users - said they chose MicroLink because it was reasonable in cost and highly effective in its means of communicating with members.

"It is a quick means of spreading the information that our members need to conduct their business efficiently", said Mr Vickerman.

"It is also a British service that is constantly bringing out new and better means of communication and in its way is a vital aid to our continual search for further British export trade".

New news service

MEMBERSHIP of MicroLink doesn't just mean access to its broad range of communications and other value added services. It also opens the door to a wealth of information on the host Telecom Gold system.

The main MicroLink menu makes it simple to dial up the many fascinating databases on Telecom Gold.

Latest addition to the list is World Reporter, a massive full-text database of international news, current affairs and business information, operated by Datasolve.

Its sources include some of the world's leading news gatherers including the Financial Times, Washington Post, The Guardian and the BBC.

Log-on to book in

MORE good news about the International Official Airline Guide, which was added to MicroLink's growing list of value added services last month.

As well as supplying the very latest data from more than 750 airlines worldwide - with details of 1 1/2 million flights - and ensuring trouble-free and more economical flight arrangements, OAG also takes the strain out of choosing a hotel at the other end of your journey.

The same source that provides you with unbiased, up-to-date flight and fare information now brings a world of hotel and motel listings to your computer

terminal. Through the medium of MicroLink you can press a few keys and view over 17,000 North American hotels, more than 9,000 in Europe and 3,000 in the Pacific area.

You simply tell the OAG Electronic Edition the city you're going to and the location you prefer - near the airport, downtown or in a nearby suburb or resort - and in seconds you get a comprehensive alphabetical listing of hotels and motels in the location you've selected.

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HERE'S HOW TO DRAW THE LINE AT COORDINATES

Part Five of the Electron graphics
series by TREVOR ROBERTS

WE have already seen how we could get our Electron to draw lines on the screen. To do this we used the keywords **MOVE** and **DRAW** along with a pair of coordinates.

These coordinates came from dividing the screen into 1280 parts horizontally and 1024 vertically.

However we saw that we couldn't switch these points on and off individually, we had to take them in blocks.

The size of these blocks, or pixels, vary with the mode the Electron is in. Program I should help refresh your memory.

This fills the screen with a grid of lines. Line 20 puts the micro into Mode 1, the four colour graphics mode we'll be sticking to for the rest of the article.

Lines 30 to 60 form a **FOR** . . . **NEXT** loop with control variable *vertical*. This varies from 0 to 1279 in steps of 16. The **MOVE** of line 40 returns the graphics cursor to the bottom of the screen, Y coordinate 0.

The **DRAW** of the next line promptly draws a line from that point to the top of the

screen, Y coordinate 1023.

As *vertical* increases in value a series of vertical lines is drawn starting at the left edge of the screen and moving across it to the right.

The next loop does the same thing, except now the lines are drawn across the screen from the left - X coordinate 0 - to the right - X coordinate 1279.

Don't be content with just looking at the listing. Try changing the program. Why have I picked a step of 16 and not 8 or 12? Try it and see.

Can you make the vertical lines appear from right to left and the horizontal from top to bottom? And what about some diagonal lines?

When you've tired of that and strained your brain thinking of coordinates have a look at Program II. This has the Electron deciding on the coordinates for you.

There's no great mystery involved in the code. Line 20 selects Mode 1 again and line 30 switches off the flashing cursor.

The **FOR** . . . **NEXT** loop of lines 40 to 70 cycles 100 times, producing in all 100 lines. Each time round the loop line 50 **MOVES** the graphics cursor to the centre of the screen, 640,512. Line 60 **DRAWs** the lines.

As ever the **DRAW** command is followed by two coordinates to tell the micro which point to draw the line to. Now, however, the micro itself chooses the point.

The X coordinate is supplied via the Electron's random

number generator with the use of a **RND(1279)**. **RND(1023)** supplies the Y coordinate.

Notice that these numbers allow the line to be drawn to any point on the screen. What do you think would happen if we allowed numbers that went off the screen with a line like:

```
60 DRAW RND(2000),RND(2000)
```

Try it and see. Leave out line 50 and explain the results.

Now all these patterns are nice, but if, like me, you're bursting with artistic talent it won't be long until your muse inspires you to produce a masterpiece woven from **MOVES** and **DRAWs**. Program III shows the result in my case.

Eat your ear off Van Gogh. Well maybe not, but it is at least vaguely recognisable as a house.

All I did to create the program was draw the outline of a piece of squared paper and estimate the coordinates. Then I just strung them together with a set of **MOVES** and **DRAWs**.

As you can see the method works, but I'm not too impressed with it.

If I went on to elaborate the building, say with a chimney or doors and windows, then I'd end up with a program that would be a long string of **MOVES** and **DRAWs**. Program IV shows a better way of tackling the same problem.

Here the program has only one **DRAW** and one **MOVE**, yet it does the same job. This is

```
10 REM Program III
20 MODE 1
30 REM BOX
40 MOVE 100,100
50 DRAW 400,100
60 DRAW 400,300
70 DRAW 100,300
80 DRAW 100,100
90 REM ROOF
100 MOVE 100,300
110 DRAW 150,400
120 DRAW 350,400
130 DRAW 400,300
140 DRAW 100,300
```

Program III

because the graphics commands are stuck inside a loop while the coordinates they use are held in the **DATA** lines at the end of the program.

As the loop cycles it reads values into three variables - *switch*, *x* and *y*. If *switch* is 1 the program **MOVES** the graphics cursor to point *x,y*.

If *switch* is 2 then *x,y* is **DRAWn** to. The final data line just contains sentinel values that stop the loop. If you wonder why there are three of them try:

```
140 DATA 3
```

and see the resulting error message. If you want an example of a tricky little bug try replacing lines 60 and 70 with:

```
60 IF switch=1 THEN MOVE
x,y ELSE DRAW x,y
```

which may at first sight appear to do the same thing.

Another way of lessening

```
10 REM Program I
20 MODE 1
30 FOR vertical=0 TO 1279 STEP 16
40 MOVE vertical,0
50 DRAW vertical,1023
60 NEXT vertical
70 FOR horizontal=0 TO 1279 STEP 16
80 MOVE 0,horizontal
90 DRAW 1279,horizontal
100 NEXT horizontal
```

Program I

```
10 REM Program II
20 MODE 1
30 VDU 23,1,0;0;0;0;
40 FOR loop=1 TO 100
50 MOVE 640,512
60 DRAW RND(1279),RND(1023)
70 NEXT loop
```

Program II

the clutter of MOVES and DRAWS that tend to accumulate in graphics programs is to use procedures to lump together the commonly used bits of artwork code. Program V shows what I mean.

If you look at PROCsquare you'll see that it consists of one MOVE and four DRAWS.

The procedure takes the point *xbase,ybase* as the bottom left-hand corner of the square and using *side* works out the coordinates of the other corners. Combining these with the appropriate keywords produces a square on screen.

Lines 30 to 80 of the program call the procedure up to 10 times. Each time the bottom left-hand corner of the square is positioned randomly and *length* varies between 0 and 200.

Notice that the figures in the RNDs of lines 50 and 60 are the screen dimensions reduced by 200. This ensures that even the largest square will fit on the screen.

Try changing the procedure so that it produces a rectangle at point *xbase,ybase* with sides of length *length* and breadth *breadth*. Why not use

it with Program II or Program IV to give the house doors, windows or even a chimney?

You could store whole elements of pictures in procedures, calling them as necessary. The only limit is your imagination, as people on television micro shows are fond of saying.

Once you've got a procedure figured out you can use it in all sorts of ways. Program VI shows our PROCsquare used to produce some nice patterns.

Although our old PROCsquare forms the basis of the program the output is completely different. This is because the parameters passed to the procedure are different.

Lines 30 to 50 give them initial values. The REPEAT ... UNTIL loop formed by lines 60 to 100 then alters their value and calls PROCsquare. It's this that causes the pattern to appear.

Try changing lines 70 and 80 to lines like:

```
70 bottomLeftX=bottomLeftX
+ 10
80 bottomLeftY=bottomLeftY
- 10
```

adding or subtracting different values each time. It's surprising how the output changes with just a minor alteration to the code.

That's all about MOVE and DRAW down in black and white. But what of coloured lines, as promised last time?

You'll recall that when we wanted coloured text we just used the COLOUR command. We can't use COLOUR to give us coloured lines, but what we can use is the GCOL - Graphics COLOUR - command. The format of the command is:

```
GCOL 0,logical colour
number
```

where the logical colour number is exactly the same as the one we used with COLOUR. Remember our talk of paint brushes or pens?

Mode 1, which we've been

```
10 REM Program V
20 MODE 1
30 FOR loop=1 TO RND(10)
40 length=RND(200)
50 bottomLeftX=RND(1079)
60 bottomLeftY=RND(823)
70 PROCsquare(bottomLeft
X,bottomLeftY,length)
80 NEXT loop
90 END
100 DEF PROCsquare(xbase,
ybase,side)
110 MOVE xbase,ybase
120 DRAW xbase,ybase+side
130 DRAW xbase+side,ybase
+side
140 DRAW xbase+side,ybase
150 DRAW xbase,ybase
160 ENDPROC
```

Program V

using in our programs, is a four colour mode, so we have available:

```
0 black
1 red
2 yellow
3 white
```

As the background is normally black it may seem daft to want to draw lines in black, but it does come in useful at times. Think of erasing lines if you don't believe me.

White is the default graphics colour at switch - on or mode change. Let's use GCOL to draw a red line. Put the Electron into Mode 1, if it isn't already, with:

```
MODE 1
```

which will automatically position the graphics cursor at 0,0 - the bottom left of the screen. Then select red with:

```
GCOL 0,1
```

Notice that the text colour doesn't change - it's still white. Now draw a line to the centre of the screen with:

```
DRAW 640,512
```

and if all is well you'll see a red line. Select yellow with:

```
GCOL 0,2
```

```
10 REM Program VI
20 MODE 1
30 bottomLeftX=500
40 bottomLeftY=500
50 side=200
60 REPEAT
70 bottomLeftX=bottomLeft
X+10
80 bottomLeftY=bottomLeft
Y+10
90 side=side-20
100 PROCsquare(bottomLeft
X,bottomLeftY,side)
110 UNTIL side<20
120 END
130 DEF PROCsquare(xbase,
ybase,side)
140 MOVE xbase,ybase
150 DRAW xbase,ybase+side
160 DRAW xbase+side,ybase
+side
170 DRAW xbase+side,ybase
180 DRAW xbase,ybase
190 ENDPROC
```

Program VI

and your diagonal is completed in yellow by:

```
DRAW 1279,1823
```

That's all we're doing on GCOL for the moment although there's an awful lot more to it, as you'll know if you've glanced at the manual.

Now that you've learnt to unleash the Electron's colours try using them in some of the previous programs. In Program I you'll find that the lines:

```
25 GCOL 0,1
65 GCOL 0,2
```

produce a yellow and red grid that looks a sort of brown/orange mixture. Program II is transformed with:

```
55 GCOL 0,RND(3)
```

while:

```
65 GCOL 0,RND(3)
```

works for Programs IV, V and VI.

● On that colourful note we'll leave it for now. Next month we'll be looking into windows.

```
10 REM Program IV
20 MODE 1
30 switch=0
40 REPEAT
50 READ switch,x,y
60 IF switch=1 THEN MOVE
x,y
70 IF switch=2 THEN DRAW
x,y
80 UNTIL switch=3
90 DATA 1,100,100,2,400,
100
100 DATA 2,400,300,2,100,
300
110 DATA 2,100,100,1,100,
300
120 DATA 2,150,400,2,350,
400
130 DATA 2,400,300,2,100,
300
140 DATA 3,3,3
```

Program IV

Star of the command performance

HAVE you been following Robin Nixon's series, Extra Commands? It started in the May 1986 issue of *Electron User* and shows how to add your own commands to Basic, like WHILE/WEND and BEEP.

This month I'm going to show how disc owners can add extra commands, not to Basic though, but to the operating system using star commands. This is much easier as you'll see, but first we need to know what happens to star commands.

When Basic — or any language for that matter — encounters a star command such as *CAT, either within a program or when entered directly from the keyboard, it is passed straight to the operating system (OS). Basic has nothing to do with it.

The OS will check the name

of the command against the ones in its command table, and if there's a match it will jump to the appropriate routine to execute it.

So *CAT will catalog the disc or tape. What interests us is what happens when the OS doesn't recognise the name.

First it is offered to any ROMs that are present. Each ROM will check the name against its own list of commands in its command table and decide whether to accept or reject it. If there's a match it

accepts it, otherwise it is rejected.

If the command is not claimed by any of the ROMs the OS will offer it to the currently selected filing system. The filing system only has a limited time in which to act on it and if it can't react fast enough the command is rejected. Try:

*TAPE
*BEEP

None of the ROMs should accept *BEEP and since the

tape filing system is slow it cannot respond quickly enough so you will get "Bad command".

Press Ctrl+D+Break if you have DFS and Ctrl+A+Break if you have ADFS. Now try:

*BEEP

and you'll see the disc drive start up. The disc filing system is pretty quick so it attempts to respond to the command.

What it is doing is looking for a file on the disc called BEEP. If it can't find one it will

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print Bad command as before.

However if it does find one it will get its load and execution addresses and, using these, *LOAD it and call it automatically. The file must be a machine code program.

Enter and run Program I. This is a very short assembly listing that creates a machine code program and saves it to disc with the name BEEP.

It assembles to page &C which the OS uses to store character definitions, but since

```
10 REM PROGRAM I
20 FOR i=0 TO 2 STEP 2
30 P1=&C00
40 [ OPT i
50 LDA #7
60 JSR &FFEE
70 RTS
80 ]
90 NEXT
100 *SAVE BEEP C00 +10
```

Program I

we aren't defining any characters it won't be needed.

BEEP is a simple routine which loads the A register with 7 and calls &FFEE — with the

same effect as VDU 7. If you CALL &C00 to run the machine code routine you'll hear a beep.

Press Break to clear the memory and again try:

*BEEP

and after a short pause you'll hear a beep. You've added an extra star command to your Electron.

Compare the length of Program I with Robin's equivalent program in the May 1986 issue and you'll see how much easier it is to add star commands.

Program II is a simple demonstration of the new command. You can see it in line 40. As with all star commands you cannot embed it in the middle of a multi-statement line, it must be the last command on the line.

If you run Program II there will be a slight delay as BEEP is loaded before executing it. This is the price we pay for storing extra commands on disc.

The faster the disc system the faster the response to the command. Notice that the

```
10 REM PROGRAM II
20 PRINT "Press a key"
30 key=GET
40 *BEEP
45 FOR i=1 TO 1000:NEXT
50 PRINT "It worked!"
```

Program II

Basic program carries on as normal after the *BEEP.

You can add many different commands using this method. In fact you're only limited by the number of files you can fit on a disc, and since a command is loaded only as and when it is needed you aren't limited by the Electron's memory.

Program I was a short and simple machine code program, but needn't necessarily be so. Program III is a much longer and more complex command. Enter and run it. The program will assemble a machine code program which is then saved to disc as FILL.

As the name suggests it's a fill routine. To use it to paint an area of the screen set the graphics colour with GCOL, MOVE to the starting point

and *FILL will fill the area.

Although not the best fill in the world it does show how powerful this system of extra commands can be.

Program IV is a graphics program demonstrating the new fill command. It draws a yacht and colours it in using *FILL.

Remember that this method of adding commands requires that you have a disc in the drive — and *MOUNTed if you have a Plus 3 — and that the files are present in the current directory or the library directory.

As you've seen from these examples any machine code program can be run simply by entering *NAME and this is treated like any other operating system command. I've shown you two new commands and I'm sure you can think of many more.

```
10 REM PROGRAM III
20 REM *FILL
30 osword=&FFF1:oswrch=&FFEE
40 x=&70:y=&72:colour=&7
50 FOR pass=0 TO 2 STEP 2
60 P1=&C00
70 [ OPT pass
80 LDA #&00:LDX #block M
90 LDA block+4:STA x:LDA block+5:STA x+1 \store x
100 LDA block+6:PHA:STA y:LDA block+7:PHA:STA y+1 \store y
110 JSR point:STA colour \get pixel colour
120 LDA #10:JSR oswrch:LD A #0:JSR oswrch:CLC:LDA colour:ADC #120:JSR oswrch \GC OL0,pixel+120
```

```
130 .up
140 JSR point:CMP #255:BE Q down:CMP colour:BNE down
150 JSR line
160 CLC:LDA y:ADC #4:STA y:LDA y+1:ADC #0:STA y+1 \y=y+4
170 JMP up
180 .down
190 PLA:STA y+1:PLA:STA y \get start y
200 .dl
210 SEC:LDA y:SBC #4:STA y:LDA y+1:SBC #0:STA y+1 \y=y-4
220 JSR point:CMP #255:BE Q end:CMP colour:BNE end
230 JSR line
240 JMP dl
250 .end
260 RTS
270
280 .point \POINT(x,y)
290 LDA x:STA block:LDA x+1:STA block+1 \set up blo
```

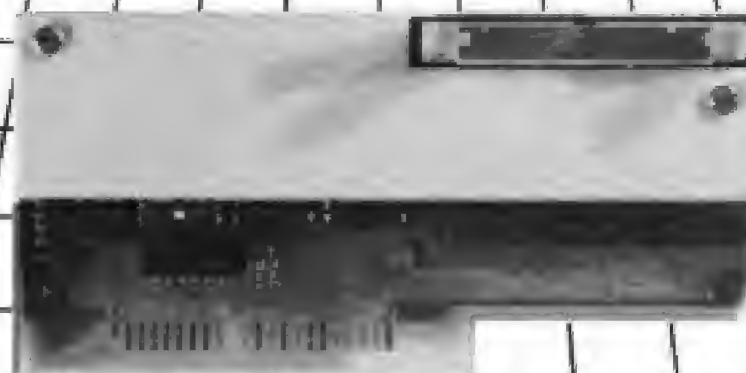
```
ck
300 LDA y:STA block+2:LDA y+1:STA block+3
310 LDA #&09:LDX #block M
320 LDA block+4 \get colour
330 RTS
340
350 .line
360 LDA #25:JSR oswrch:LD A #77:JSR oswrch \PLOT 77,x,y
370 LDA x:JSR oswrch:LDA x+1:JSR oswrch
380 LDA y:JSR oswrch:LDA y+1:JSR oswrch
390 RTS
400
410 .block
420 EQU0 0:EQU0 0
430 ]
440 NEXT
450 *SAVE FILL C00 +00
```

Program III

```
10 REM PROGRAM IV
20 MODE 2
30 VDU 23,1,0:0:0:0:
40 MOVE 300,500:DRAW 800,500:DRAW 700,400:DRAW 400,400:DRAW 300,500
50 MOVE 0,450:DRAW 350,450:MOVE 1200,450:DRAW 750,450
60 MOVE 300,540:DRAW 500,540:DRAW 500,900:DRAW 300,540
70 MOVE 600,540:DRAW 800,540:DRAW 600,900:DRAW 600,540
80 MOVE 100,100:GCOL 0,4:*FILL
90 MOVE 900,430:*FILL
100 MOVE 574,550:GCOL 0,1:*FILL
110 MOVE 610,560:GCOL 0,2:*FILL
120 MOVE 640,475:GCOL 0,5:*FILL
130 MOVE 10,800:GCOL 0,6:*FILL
140 MOVE 1000,800:*FILL
150 MOVE 1000,475:*FILL
160 MOVE 590,800:*FILL
170 MOVE 590,500:GCOL 0,0:DRAW 590,950
```

Program IV

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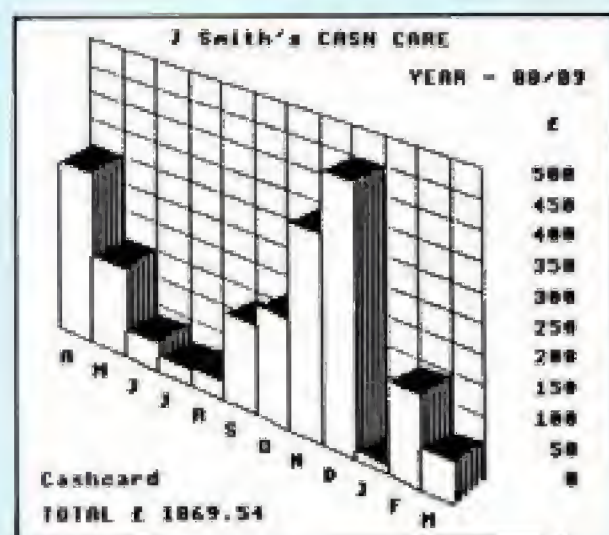
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0000004	04/08/88	400.00	400.00
0000005	05/08/88	500.00	500.00
0000006	06/08/88	600.00	600.00
0000007	07/08/88	700.00	700.00
0000008	08/08/88	800.00	800.00
0000009	09/08/88	900.00	900.00
0000010	10/08/88	1000.00	1000.00
0000011	11/08/88	1100.00	1100.00
0000012	12/08/88	1200.00	1200.00
0000013	13/08/88	1300.00	1300.00
0000014	14/08/88	1400.00	1400.00
0000015	15/08/88	1500.00	1500.00
0000016	16/08/88	1600.00	1600.00
0000017	17/08/88	1700.00	1700.00
0000018	18/08/88	1800.00	1800.00
0000019	19/08/88	1900.00	1900.00
0000020	20/08/88	2000.00	2000.00
0000021	21/08/88	2100.00	2100.00
0000022	22/08/88	2200.00	2200.00
0000023	23/08/88	2300.00	2300.00
0000024	24/08/88	2400.00	2400.00
0000025	25/08/88	2500.00	2500.00
0000026	26/08/88	2600.00	2600.00
0000027	27/08/88	2700.00	2700.00
0000028	28/08/88	2800.00	2800.00
0000029	29/08/88	2900.00	2900.00
0000030	30/08/88	3000.00	3000.00
0000031	31/08/88	3100.00	3100.00
0000032	01/09/88	3200.00	3200.00
0000033	02/09/88	3300.00	3300.00
0000034	03/09/88	3400.00	3400.00
0000035	04/09/88	3500.00	3500.00
0000036	05/09/88	3600.00	3600.00
0000037	06/09/88	3700.00	3700.00
0000038	07/09/88	3800.00	3800.00
0000039	08/09/88	3900.00	3900.00
0000040	09/09/88	4000.00	4000.00
0000041	10/09/88	4100.00	4100.00
0000042	11/09/88	4200.00	4200.00
0000043	12/09/88	4300.00	4300.00
0000044	13/09/88	4400.00	4400.00
0000045	14/09/88	4500.00	4500.00
0000046	15/09/88	4600.00	4600.00
0000047	16/09/88	4700.00	4700.00
0000048	17/09/88	4800.00	4800.00
0000049	18/09/88	4900.00	4900.00
0000050	19/09/88	5000.00	5000.00
0000051	20/09/88	5100.00	5100.00
0000052	21/09/88	5200.00	5200.00
0000053	22/09/88	5300.00	5300.00
0000054	23/09/88	5400.00	5400.00
0000055	24/09/88	5500.00	5500.00
0000056	25/09/88	5600.00	5600.00
0000057	26/09/88	5700.00	5700.00
0000058	27/09/88	5800.00	5800.00
0000059	28/09/88	5900.00	5900.00
0000060	29/09/88	6000.00	6000.00
0000061	30/09/88	6100.00	6100.00
0000062	01/10/88	6200.00	6200.00
0000063	02/10/88	6300.00	6300.00
0000064	03/10/88	6400.00	6400.00
0000065	04/10/88	6500.00	6500.00
0000066	05/10/88	6600.00	6600.00
0000067	06/10/88	6700.00	6700.00
0000068	07/10/88	6800.00	6800.00
0000069	08/10/88	6900.00	6900.00
0000070	09/10/88	7000.00	7000.00
0000071	10/10/88	7100.00	7100.00
0000072	11/10/88	7200.00	7200.00
0000073	12/10/88	7300.00	7300.00
0000074	13/10/88	7400.00	7400.00
0000075	14/10/88	7500.00	7500.00
0000076	15/10/88	7600.00	7600.00
0000077	16/10/88	7700.00	7700.00
0000078	17/10/88	7800.00	7800.00
0000079	18/10/88	7900.00	7900.00
0000080	19/10/88	8000.00	8000.00
0000081	20/10/88	8100.00	8100.00
0000082	21/10/88	8200.00	8200.00
0000083	22/10/88	8300.00	8300.00
0000084	23/10/88	8400.00	8400.00
0000085	24/10/88	8500.00	8500.00
0000086	25/10/88	8600.00	8600.00
0000087	26/10/88	8700.00	8700.00
0000088	27/10/88	8800.00	8800.00
0000089	28/10/88	8900.00	8900.00
0000090	29/10/88	9000.00	9000.00
0000091	30/10/88	9100.00	9100.00
0000092	31/10/88	9200.00	9200.00
0000093	01/11/88	9300.00	9300.00
0000094	02/11/88	9400.00	9400.00
0000095	03/11/88	9500.00	9500.00
0000096	04/11/88	9600.00	9600.00
0000097	05/11/88	9700.00	9700.00
0000098	06/11/88	9800.00	9800.00
0000099	07/11/88	9900.00	9900.00
0000100	08/11/88	10000.00	10000.00

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ENTRY	TYPE	AMOUNT	DATE
1	B	100.00	01/08/88
2	B	200.00	02/08/88
3	B	300.00	03/08/88
4	B	400.00	04/08/88
5	B	500.00	05/08/88
6	B	600.00	06/08/88
7	B	700.00	07/08/88
8	B	800.00	08/08/88
9	B	900.00	09/08/88
10	B	1000.00	10/08/88
11	B	1100.00	11/08/88
12	B	1200.00	12/08/88
13	B	1300.00	13/08/88
14	B	1400.00	14/08/88
15	B	1500.00	15/08/88
16	B	1600.00	16/08/88
17	B	1700.00	17/08/88
18	B	1800.00	18/08/88
19	B	1900.00	19/08/88
20	B	2000.00	20/08/88
21	B	2100.00	21/08/88
22	B	2200.00	22/08/88
23	B	2300.00	23/08/88
24	B	2400.00	24/08/88
25	B	2500.00	25/08/88
26	B	2600.00	26/08/88
27	B	2700.00	27/08/88
28	B	2800.00	28/08/88
29	B	2900.00	29/08/88
30	B	3000.00	30/08/88
31	B	3100.00	31/08/88
32	B	3200.00	01/09/88
33	B	3300.00	02/09/88
34	B	3400.00	03/09/88
35	B	3500.00	04/09/88
36	B	3600.00	05/09/88
37	B	3700.00	06/09/88
38	B	3800.00	07/09/88
39	B	3900.00	08/09/88
40	B	4000.00	09/09/88
41	B	4100.00	10/09/88
42	B	4200.00	11/09/88
43	B	4300.00	12/09/88
44	B	4400.00	13/09/88
45	B	4500.00	14/09/88
46	B	4600.00	15/09/88
47	B	4700.00	16/09/88
48	B	4800.00	17/09/88
49	B	4900.00	18/09/88
50	B	5000.00	19/09/88
51	B	5100.00	20/09/88
52	B	5200.00	21/09/88
53	B	5300.00	22/09/88
54	B	5400.00	23/09/88
55	B	5500.00	24/09/88
56	B	5600.00	25/09/88
57	B	5700.00	26/09/88
58	B	5800.00	27/09/88
59	B	5900.00	28/09/88
60	B	6000.00	29/09/88
61	B	6100.00	30/09/88
62	B	6200.00	01/10/88
63	B	6300.00	02/10/88
64	B	6400.00	03/10/88
65	B	6500.00	04/10/88
66	B	6600.00	05/10/88
67	B	6700.00	06/10/88
68	B	6800.00	07/10/88
69	B	6900.00	08/10/88
70	B	7000.00	09/10/88
71	B	7100.00	10/10/88
72	B	7200.00	11/10/88
73	B	7300.00	12/10/88
74	B	7400.00	13/10/88
75	B	7500.00	14/10/88
76	B	7600.00	15/10/88
77	B	7700.00	16/10/88
78	B	7800.00	17/10/88
79	B	7900.00	18/10/88
80	B	8000.00	19/10/88
81	B	8100.00	20/10/88
82	B	8200.00	21/10/88
83	B	8300.00	22/10/88
84	B	8400.00	23/10/88
85	B	8500.00	24/10/88
86	B	8600.00	25/10/88
87	B	8700.00	26/10/88
88	B	8800.00	27/10/88
89	B	8900.00	28/10/88
90	B	9000.00	29/10/88
91	B	9100.00	30/10/88
92	B	9200.00	31/10/88
93	B	9300.00	01/11/88
94	B	9400.00	02/11/88
95	B	9500.00	03/11/88
96	B	9600.00	04/11/88
97	B	9700.00	05/11/88
98	B	9800.00	06/11/88
99	B	9900.00	07/11/88
100	B	10000.00	08/11/88

Sound	N/A
Graphics	8
Ease of use	9
Value	10
Overall	9

Program: Bullseye
Price: £7.95
Supplier: Macsen, 17 Nott
Square, Carmarthen,
Dyfed SA31 1PQ. Tel:
0267 232508

Bullseye loses on points

ELECTRON owners can now experience the tension of ITV's popular dart throwing quiz called Bullseye. The game's format faithfully follows that of the TV program except that it involves just two players.

The first part involves throwing a single dart at a board divided into eight segments. If you hit the area you aimed for you win points and get a question.

A correct answer to the

question earns you more points. A wrong answer means your opponent can try to answer it.

Each player has three turns at this and points can only be scored when the section is hit for the first time.

Round two uses a standard match play dartboard. Again the players take turns to throw darts and the person with the highest score earns a question. If this is answered correctly, the darts' score is added to that player's total.

After three rounds the winner moves on to the prize board. Nine darts are thrown and if they land in the small red sections more points are won.

The fourth part of the game involves a gamble. If you can score 101 or more with four darts your score is doubled. If you fail your score is halved.

The graphics are good, with

the dart board drawn quickly and neatly. Bully is drawn even more quickly and he bears a good likeness to the TV version.

Even the text is well presented using an unusual, but clear, set of characters.

A couple of spelling bugs are an irritant. I'm not an expert at darts but I thought the line you stand at was called the oche. Macsen have their own version.

Program: Tennis
Price: £2.99
Supplier: Bug-Byte, Liberty House, 222 Regent Street, London W1R 7DB. Tel: 01-439 0666

Played out of court

SHOULD you be one of the many thousands of people who spend Wimbledon fortnight glued to the TV set you may have considered trying a computer simulation.

Bug-Byte have just released one such program, though I doubt whether it's destined to be a winner.

You have the option of playing one or three sets with

either four or six games per set.

Control is via keyboard or joystick and your opponent is always the computer — you cannot challenge a friend.

This is a pity as the computer provides such stiff opposition that you will normally only win one or two points during a complete set.

The court is drawn with perspective going into your screen, the computer always being at the top of the screen.

When serving, as in the real game, you must remember to keep your feet behind the baseline or you will be foot faulted.

Your player can travel left, right, and up and down the court, and balls can either be volleyed or taken as groundstrokes.

When volleying from the net I would suggest that you do not stand too close as you will tend to hit the ball out of court.

I can only assume that the angle of the shot which you play is determined by your position in relation to the ball, though I didn't find that this made too much difference.

The ball's flight and its associated shadow, was relatively smooth, although on several occasions it vanished for a fraction of a second in mid-flight.

The characters representing the players are large, angular and rather crude. The best part of the screen is the scoreboard where electronic style numbers display sets, points, and server.

Had the game employed a



user selectable skill option it would probably have had more lasting appeal. But in its present form I feel it would soon be abandoned by a thoroughly demoralised player.

James Riddell

<i>Sound</i>	6
<i>Graphics</i>	6
<i>Playability</i>	6
<i>Value</i>	6
<i>Overall</i>	6

Program: Savage Pond
Price: £2.99
Supplier: Bug-Byte, Liberty House, 222 Regent Street, London W1R 7DB. Tel: 01-439 0666

Bargain in the pond

TO most people a frog is a small green slimy amphibian which sits lazily on a lily pad devouring passing flies. I too had this impression until I tried my hand at the tadpole survival course, otherwise known as the Savage Pond.

The screen displays a cross

sectional view of the pond. When the game begins the pond is quite barren except for a handful of hydra on the bottom.

Having emerged from one of three eggs you begin to stuff yourself with the nutritious amoebae which float in the water above.

These are useful for gaining points, but do little to aid your progress towards becoming a frog.

Froghood is achieved by consuming the worms which drift from the surface to the bottom. For every five worms consumed you take a step towards maturity, nine such steps and you become a frog.

Unfortunately for our wrig-

gling buddy, life is not a bed of lilies. Apart from the deadly hydra you must also cope with eggs dropped by passing dragonflies.

It is imperative that these are consumed before they reach the bottom because if they are allowed to hatch you will meet your maker at the jaws of a dragonfly larva.

For each step you take towards maturity a new hazard is introduced to the pond.

These take the form of jellyfish, spiders, and even radioactive waste.

Savage Pond was reviewed in this magazine over 18 months ago and received a very favourable reception. It



has now been re-released at less than half the price and is therefore a bargain not to be missed.

Carol Barrow

<i>Sound</i>	7
<i>Graphics</i>	7
<i>Playability</i>	8
<i>Value</i>	8
<i>Overall</i>	8

Program: Jack Attac
Price: £2.99
Supplier: Bug-Byte, Liberty House, 222 Regent Street, London W1R 7DB. Tel: 01-439 0666

Stay ahead of the giant

ONCE upon a time there was a young man named Jack who had a beautiful girlfriend called Jill — until the local giant incarcerated her in his castle.

Being a brave sort of chap

Jack decided to enter the castle to attempt a rescue.

The castle takes the form of a 45 screen maze which you must negotiate in order to find the key which will unlock Jill's dungeon.

Different areas are sealed off by coloured doors. These are unlocked by coloured keys which are to be found around the castle.

I don't know if the giant is a greengrocer in his spare time but the castle is littered with pieces of fruit. Every one must be collected before you are allowed to free Jill.

As soon as you have released your beloved, the giant will awaken. You must therefore escape from the castle within the next two minutes.

The 45 screens do not need to be completed in sequence, and you are free to wander from place to place as you seek the next key.

Each screen is big, colourful and normally patrolled by a nicely detailed bad guy.

There are also secret passages which can take you from one section to another without the need for a key. I found Jack



Attac a well written, fun to play, and sensibly priced program.

James Riddell

<i>Sound</i>	7
<i>Graphics</i>	7
<i>Playability</i>	8
<i>Value</i>	8
<i>Overall</i>	8

Program: Terrormolinos
Price: £6.95
Supplier: Melbourne House,
60 High Street, Hampton
Wick, Kingston-upon-
Thames, Surrey KT1 4DB.
Tel: 01-943 3911

The game in Spain...

THIS is the best adventure game I have yet seen from Melbourne House.

The object of the adventure is to go on holiday with your family to Spain, taking 10 photographs while you are there. All the photographs have to be taken in the right

places and it is up to you to find out where they are.

You start at home. A taxi is due soon to take you to the airport and you must search the house for the things you will need in Spain and get your family together before it arrives.

On arrival you check in at your hotel (make sure it is the right one) and change into more suitable attire before visiting the local shops.

An exploration of the nearby beach will lead to a rewarding encounter with a shark.

You should now sample the nightlife, though the red light district has nothing to do with developing your photographs.

You will find that three coach trips are laid on so remember to take your camera. A colloquial insult will help you to find the missing passenger at the monastery.

The problem that I get asked most is how do you avoid being killed by the bull?

This is solved by remembering that you do not need to protect your head at the moment and by allowing it to break some crockery.

As is immediately apparent from the title, the adventure is very tongue-in-cheek. Unlike Hampstead, where the humour seemed laboured, Terrormolinos hits the right note every time.

Paul Gardner



Presentation	7
Atmosphere	8
Frustration factor	8
Value	7
Overall	8

Program: Jet Set Willy
Price: £7.95
Supplier: Tynesoft, Addison
Industrial Estate, Blaydon,
Tyne & Wear NE21 4TE
Tel: 091-414 4611

Life is hard for Willy

MANIC Miner was a ladders and levels game which graced just about every home computer on the market. As with most successful games it was quickly followed by a sequel, in this case Jet Set Willy.

Having escaped from the mine, Miner Willy wasted no

time at all in spending his new found wealth. After buying a mansion and yacht he decided to throw a party.

The party is a wild success but the housekeeper is rather upset about the aftermath. Willy is given an ultimatum: No sleep until all of the debris has been cleared.

When you live in a 100 room mansion that is some headache.

With Manic Miner each individual screen had to be completed before starting the next. With Jet Set Willy there are no such constraints – you as Willy can wander from screen to screen at will.

However you will only be

awarded points for collecting the objects from the party.

When you load up the game for the first time you will see that you are provided with eight Willies. This might seem to be very generous but there is a problem.

Should you manoeuvre Willy into a position that will mean certain death, he will die. He will then be reincarnated in the very same position, unless you have lightning reflexes then he will die again, and again, and you will soon be minus several Willies. Once I lost all eight Willies in under three seconds.

On several occasions I entered the bedroom only to



be shown the way out by the irate housekeeper. What I can't understand is that if Willy can afford a 100 bedroom mansion why can't he get decent staff? **Carol Barrow**

Sound	7
Graphics	7
Playability	8
Value	8
Overall	8

Program: Ian Botham's Test Match
Price: £7.95
Supplier: Tynesoft, Addison
Industrial Estate, Blaydon,
Tyne & Wear NE21 4TE
Tel: 091-414 4611

Botham plays on

RAIN may stop play on a regular basis at the Oval but it should cause few problems if you're playing Ian Botham's Test Match. The armchair enthusiast can now put willow to leather all year round.

The game allows one or two players to compete over 16 overs, 32 overs, or a full two

innings test match.

When playing against the computer you are always put in to bat first.

A choice of four strokes is available. They are selected by holding down the appropriate key and pressing the Return key to execute the stroke as the ball approaches.

The timing here is very difficult to judge. Unfortunately no matter what stroke the batsman plays he always performs the same movements.

Once your side has bitten the dust – and that won't take long – you position your fielders before bowling. Players are moved using a combination of four keys and set in position by pressing a

fifth. On several occasions I found that this positioning key had to be pressed numerous times before a player was released.

You are provided with a choice of four bowlers each having a different pace or style. Having selected fast, medium, spin, or bouncer, just press the Q key and the bowler will make his run up.

When fielding a ball you first move a cursor to the player you wish to move before you can begin to chase the ball.

Normally by the time you have made your selection the ball has reached the boundary.

An element of humour is provided by a little duck, complete with bat and cap,



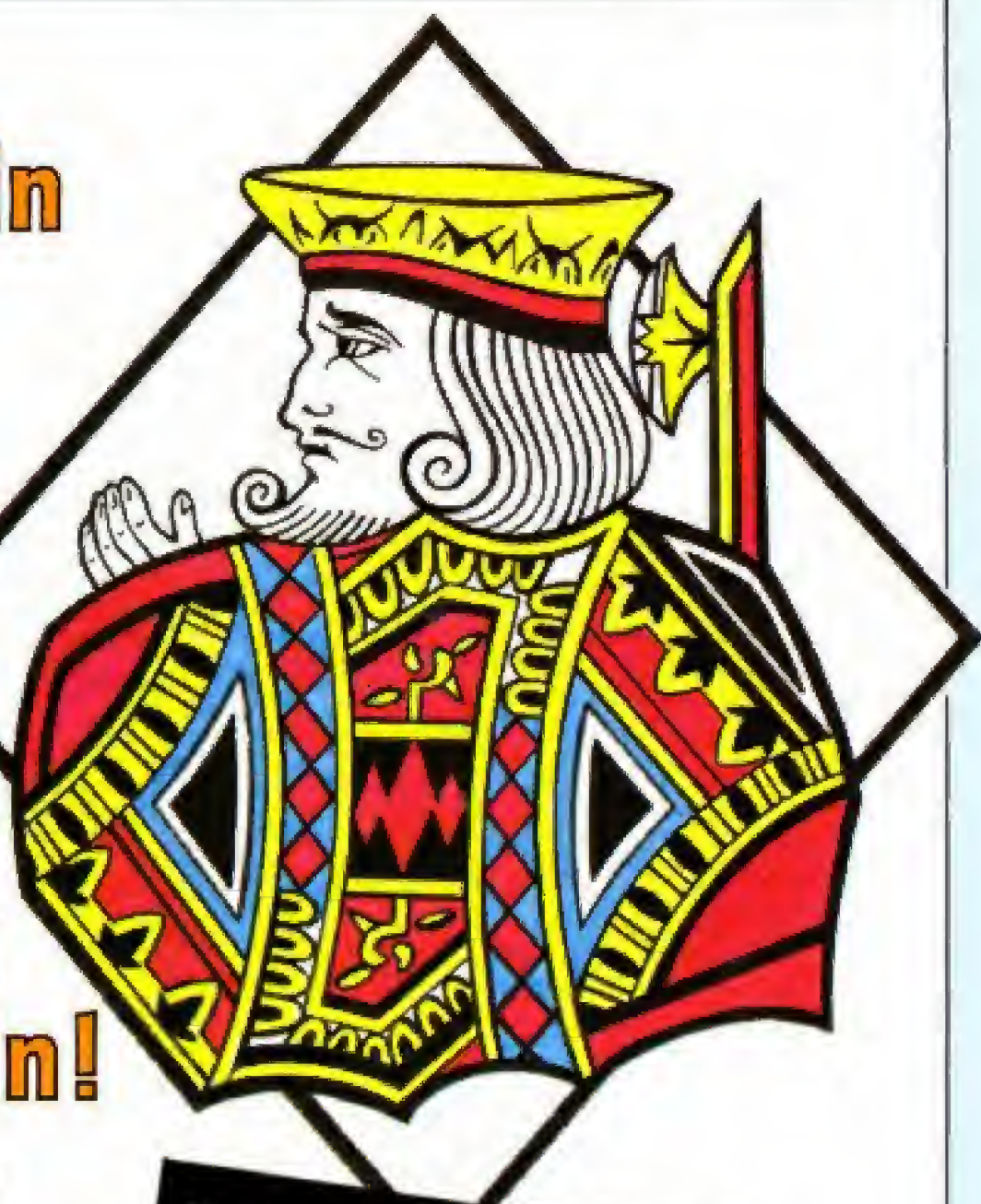
which leaves the field with a tear in its eye as your exit for no runs.

The graphics used in the game are quite reasonable, it is just a pity that the game is so awkward to play.

John Revis

Sound	4
Graphics	6
Playability	5
Value	6
Overall	6

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THE Attributes Trail is a two player game in which you and your opponent score points by matching colours and shapes.

You move from square to square on a grid, trying to keep on the same shape or colour.

The game is educational fun for children aged five and over, and is also a brain teaser for adults.

Young children will only be looking one move ahead, but they will be learning about left, right, up and down, as well as shape and colour.

Cannier games players will work out some strategy, but as each square can only be visited once beware of getting blocked in.

You can increase the difficulty of the game either by reducing the time available for each move or by making it illegal to move to a square of the same colour as your opponent's. These options are given in the game.

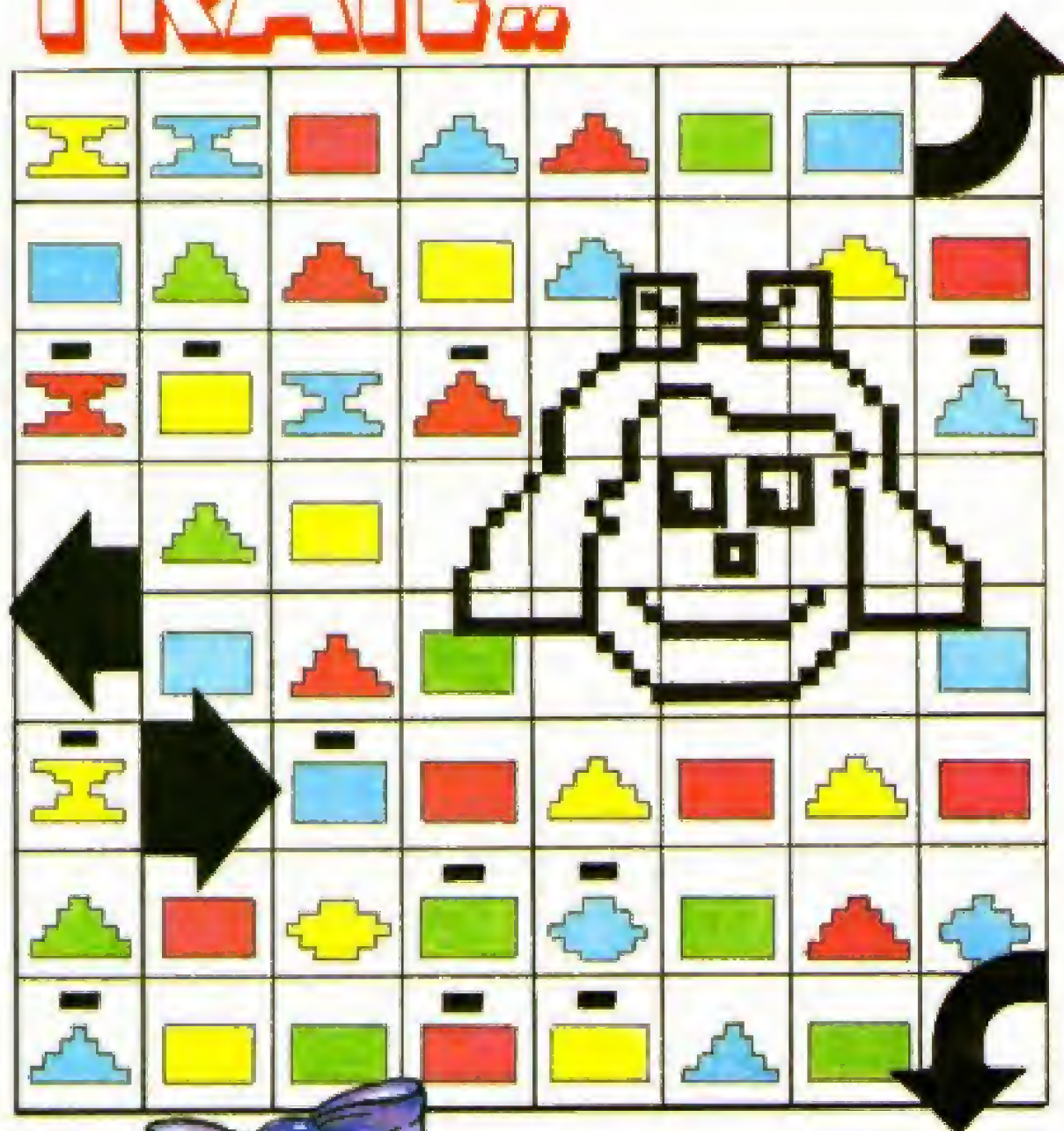
A feature of the program is the input routine for players' names. Instead of plain INPUT the letters in the name are taken one at a time and amended so that the name appears as a child would write it - first letter is upper case, remaining letters lower case.

The routine also detects spaces and full stops and puts the next letter in upper case.

At the end of the game the faces of the players are drawn with names and scores underneath.

THE ATTRIBUTES TRAIL..

By ROG FROST



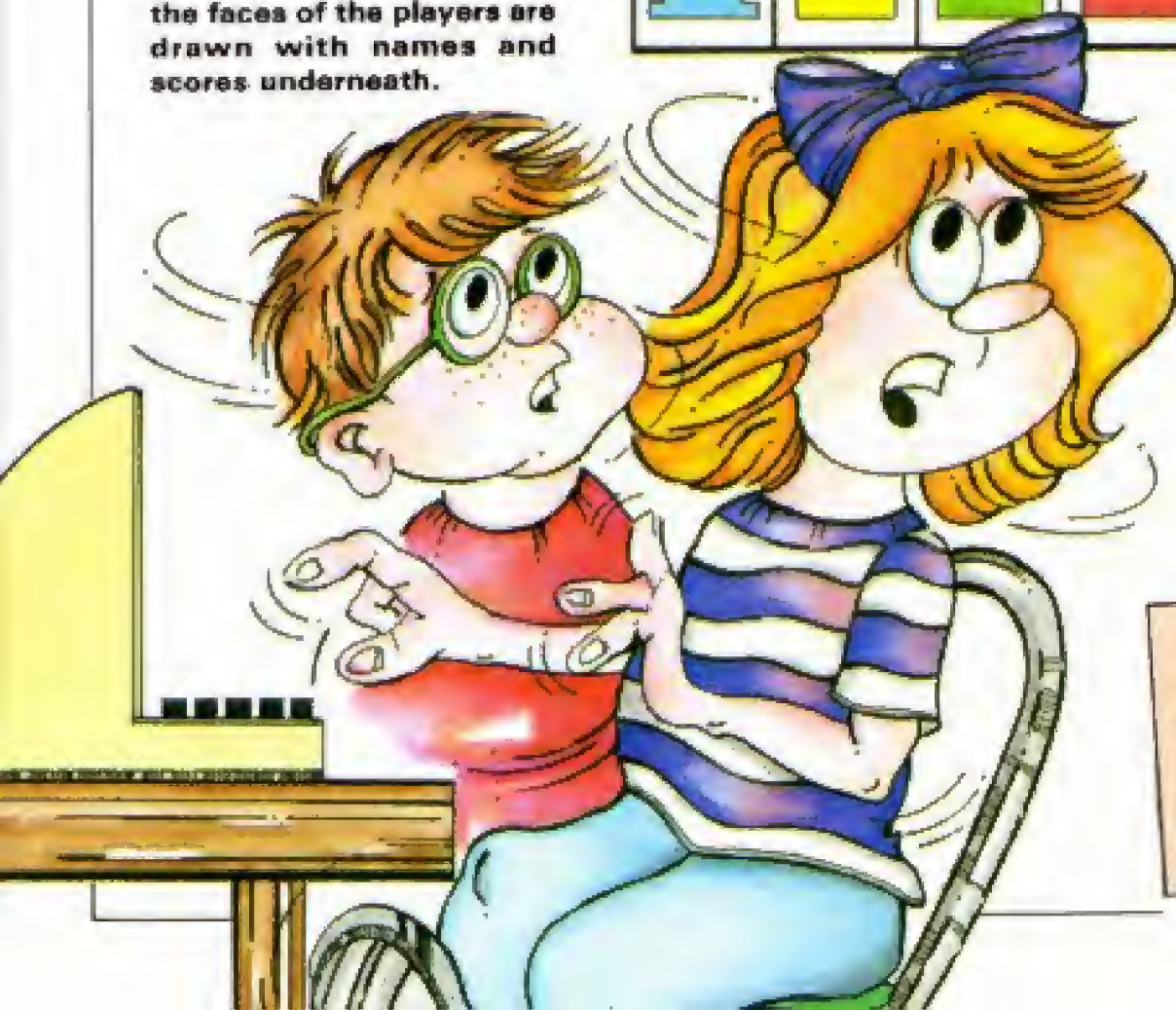
Full listing starts
on Page 18

PROCEDURES

init Defines characters and variables.
instruct Prints instructions.
grid Sets up the screen.
delay A short pause.
end Draws the faces at the end.

VARIABLES

col%(63) Colour in each square.
shape%(63) Shape in each square.
name\$(2) Players' names.
move% Number of goes taken.
direction\$ Player's requested move.
wait% Time permitted for each move.



From Page 17

```

10 REM Attribute Trail
20 REM By Rog Frost
30 REM (c) Electron User
40 IF PAGE>4000 GOTO2200
50 MODE6
60 ON ERROR GOTO2140
70 PROCsetup
80 PROCinstruct
90 REPEAT
100 MODE6
110 PROCinit
120 MODE2
130 PROCgrid
140 REPEAT
150 PROCplayerone
160 PROCplayertwo
170 UNTILmoveX>39
180 MODE5
190 PROCend
200 UNTILO
210 END
220 DEFPROCgrid
230 VDU23;8202;0;0;0;
240 FORgridX=200TO1000STE
P100
250 MOVEgridX,200:DRAWgri
dX,1000
260 MOVE200,gridX:DRAW100
0,gridX
270 NEXT
280 MOVE0,100:DRAW1279,10
0:MOVE0,120:DRAW1279,120:MO
VE0,60:DRAW1279,60
290 MOVE0,0:DRAW0,100:MOV
E1279,0:DRAW1279,100:MOVE64
0,100:DRAW640,120:MOVE430,1
20:DRAW430,0:MOVE060,120:DR
AW060,0
300 PRINTTAB(1,27);name$(
1)TAB(13,27);name$(2)
310 PRINTTAB(7,29)"Score"
TAB(7,31)"Turns"TAB(0,0);
320 PRINTTAB(3,29)"0"TAB(
15,29)"0"
330 PRINTTAB(3,31)"20"TAB
(15,31)"20"TAB(0,0);
340 VDU5
350 FORcellX=0TO63
360 GCOL0,colX(cellX):MOV
EcellX MOD 8*100+220,cellX
DIV8*100+250:PRINTCHR$shape
X(cellX)
370 NEXT
380 GCOL0,7:MOVEposoneX M

```

```

OD 8*100+220,posoneX DIV8*1
00+200:PRINT"*"
390 MOVEpostwoX MOD 8*100
+220,postwoX DIV8*100+200:P
RINT"*"
400 VDU4
410 ENDPROC
420 DEFPROCplayerone
430 VDU5:GCOL0,15:MOVEpos
oneX MOD 8*100+220,posoneX
DIV8*100+200:PRINT"*"
440 GCOL0,7:MOVEpostwoX M
OD 8*100+220,postwoX DIV8*1
00+200:PRINT"*"
450 VDU4
460 COLOUR0:PRINTTAB(1,27
);name$(1):COLOUR7:PRINTTAB
(13,27);name$(2)
470 PRINTTAB(3,31)" *TA
B(3,31);21-(moveX+2)DIV2TAB
(0,0);
480 *FX15,0
490 direction$=INKEY$(wai
tX)
500 moveX=moveX+1
510 IF(direction$="U"OR d
irection$="u")AND posoneX<5
6 newposX=posoneX+0
520 IF (direction$="D"OR
direction$="d") AND posoneX
>7 newposX=posoneX-0
530 IF (direction$="R"OR
direction$="r") AND posone
X MOD 8<>7 newposX=posoneX
+1
540 IF (direction$="L"ORd
irection$="l") AND posoneX
MOD 8<>0 newposX=posoneX-
1
550 SOUND1,-15,moveX*5,2
560 IF flagX(newposX)=1
SOUND1,1,100,50:PROCdelay:E
NDPROC
570 IF difficultX=1 AND c
olX(newposX)=colX(postwoX)
SOUND1,1,100,50:PROCdelay:
ENDPROC
580 VDU5:GCOL0,0:MOVEposo
neX MOD 8*100+220,posoneX D
IV8*100+200:PRINT"*":GCOL0,
7:MOVEposoneX MOD 8*100+220
,posoneX DIV8*100+200:PRINT
:CHR$229:VDU4
590 flagX(newposX)=1
600 scoreoneX=scoreoneX+1
610 IFcolX(newposX)=colX

```

```

(posoneX) scoreoneX=scoreon
eX+1
620 IFshapeX(newposX)=sh
apeX(posoneX) scoreoneX=sco
reoneX+1
630 posoneX=newposX
640 GCOL0,7:VDU5:MOVEposo
neX MOD 8*100+220,posoneX D
IV8*100+200:PRINT"*":VDU4
650 PRINTTAB(3,29)" *TA
B(3,29);scoreoneX
660 ENDPROC
670 DEFPROCplayertwo
680 VDU5:GCOL0,15:MOVEpos
twoX MOD 8*100+220,postwoX
DIV8*100+200:PRINT"*"
690 GCOL0,7:MOVEposoneX M
OD 8*100+220,posoneX DIV8*1
00+200:PRINT"*"
700 VDU4
710 COLOUR0:PRINTTAB(13,2
7);name$(2):COLOUR7:PRINTTA
B(1,27);name$(1)
720 PRINTTAB(15,31)" *T
AB(15,31);21-(moveX+2)DIV2T
AB(0,0);
730 *FX15,0
740 direction$=INKEY$(wai
tX)
750 moveX=moveX+1
760 IF(direction$="u" OR
direction$="U")AND postwoX<
56 newposX=postwoX+0
770 IF(direction$="d" OR
direction$="D")AND postwoX>
7 newposX=postwoX-0
780 IF(direction$="r" OR
direction$="R")AND postwoX
MOD 8<>7 newposX=postwoX+1
790 IF(direction$="l" OR
direction$="L")AND postwoX
MOD 8<>0 newposX=postwoX-1
800 SOUND1,-15,moveX*5,2
810 IF flagX(newposX)=1 5
OUND1,1,100,50:PROCdelay:EN
DPROC
820 IF difficultX=1 AND c
olX(newposX)=colX(posoneX)
SOUND1,1,100,50:PROCdelay:E
NDPROC
830 VDU5:GCOL0,0:MOVEpost
woX MOD 8*100+220,postwoX D
IV8*100+200:PRINT"*":GCOL0,
7:MOVEpostwoX MOD 8*100+220
,postwoX DIV8*100+200:PRINT
:CHR$229:VDU4

```

```

































































840 flagX(newposX)=1
850 scoretwoX=scoretwoX+1
860 IFshapeX(newposX)=sha
peX(postwoX) scoretwoX=sco
retwoX+1
870 IFcolX(newposX)=colX(
postwoX) scoretwoX=scoretwo
X+1
880 postwoX=newposX
890 GCOL0,7:VDU5:MOVEpost
woX MOD 8*100+220,postwoX D
IV8*100+200:PRINT"*":VDU4
900 PRINTTAB(15,29)" *TA
B(15,29);scoretwoX
910 ENDPROC
920 DEFPROCsetup
930 VDU23,225,255,255,255
,255,255,255,255,255
940 VDU23,226,24,24,60,60
,126,126,255,255
950 VDU23,227,24,60,126,2
55,255,126,60,24
960 VDU23,228,255,126,60,
24,24,60,126,255
970 VDU23,229,24,24,0,0,0
,0,0,0
980 ENVELOPE1,2,-10,-5,-2
,2,3,4,0,0,0,0,0,0
990 DIMcolX(63),shapeX(63
),flagX(63),name$(2)
1000 ENDPROC
1010 DEFPROCinit
1020 FORcellX=0TO63
1030 colX(cellX)=RND(4):sh
apeX(cellX)=224+RND(4):flag
X(cellX)=0
1040 NEXT
1050 posoneX=0:postwoX=63
1060 flagX(posoneX)=1:flag
X(postwoX)=1
1070 scoreoneX=0:scoretwoX
=0
1080 moveX=0
1090 newposX=0:newposX=0
1100 *FX11,0
1110 *FX4,2
1120 *KEY12"L"
1130 *KEY13"R"
1140 *KEY14"D"
1150 *KEY15"U"
1160 ENDPROC
1170 DEFPROCinstruct
1180 VDU19,0,4,0,0,0
1190 VDU23;8202;0;0;0;
1200 VDU20,10,3,30,0
1210 PRINT"THE ATTRIBUTES

```



```
TRAIL *****
***
```

```
1220 VDU28,1,24,39,4
1230 PRINTTAB(2,14)"Use a
name of 7 letters or less."
1240 FORNZ=1TO2
1250 PRINTTAB(0,2*NZ^2)"Pl
ayer ";NZ;". Please type in
your name." Then press RE
TURN."
1260 name$(NZ)=""
1270 REPEAT
1280 get=GET
1290 IF LEN(name$(NZ))=0 A
ND get>90 get=get-32 ELSE I
F LEN(name$(NZ))=0 GOTO1300
1300 IF get=127 THEN VDU12
7:name$(NZ)=LEFT$(name$(NZ)
,(LEN(name$(NZ))-1)):GOTO12
80
1310 IF(RIGHT$(name$(NZ),1
)=", "OR RIGHT$(name$(NZ),1
)=", ") AND get>90 get=get-32
ELSE IF(RIGHT$(name$(NZ),1
)=", "OR RIGHT$(name$(NZ),1
)=", ")GOTO1330
1320 IF LEN(name$(NZ))>0 A
ND get>46AND get<97 get=get
+32
1330 PRINTCHR$(get);:name$
(NZ)=name$(NZ)+CHR$(get):UN
TILget=13 OR LEN(name$(NZ))
=8
1340 name$(NZ)=LEFT$(name$
(NZ),LEN(name$(NZ))-1)
1350 NEXT
1360 PROCcont
1370 PRINT;name$(1);" star
ts with a star at the""bot
tom left of the grid."name
$(2);" has a star at the to
p right""of the grid. When
it's your turn,""your nae
e and star will flash."
1380 PRINT"Each player ta
kes a turn to move their""
star one position up, down,
left or""right. This can
be done by entering""the f
irst letter of the word or
the""arrow keys may be use
d instead."
1390 PRINT"The aim of the
game is to score as""many
points as possible by tryi
ng""to move to a new squar
```

Bilbo		Thorin	
25	Score	21	
7	Turns	8	

e with the""same shape and colour as the square""you leave."

1400 PROCcont

1410 PRINT"The scores are as follows:-""3...for moving to a new square which""has a symbol of the same shape""and colour as the one you have left."

1420 PRINT"2...if you manage to match just the""shape or the colour."

1430 PRINT"1...if you move to a new square""which does not match your last one""at all."

1440 PROCcont

1450 PRINT"No square on the grid may be visited""twice. A marker stays in each square""visited."

1460 PRINT"If you attempt an illegal move, you""will hear a wobbly noise and I

oose""your turn."

1470 PRINT"Each player has twenty moves in""which to earn as many points as""possible."

1480 PRINT"Scores are shown below the grid."

1490 PROCcont

1500 PRINT"You may set the time allowed for each""move. Enter the number of seconds."INPUTwaitX:waitX=waitX*100

1510 IF waitX>5000 waitX=5000

1520 IF waitX<500 PRINT"T hat would be rather fast. Please""enter at least 5 seconds."PROCdelay:CLS:GOTO1500

1530 PRINT""You may add to the difficulty of the""game by making it illegal to move""to a square of the same colour as""your oppon

ent. Press D if you want""this option else any other letter."

1540 *FX282,32

1550 B\$=GET\$:IFB\$="D" difficultX=1 ELSEdifficultX=0

1560 PROCcont

1570 ENDPROC

1580 DEFPROCdelay:TIME=0:REPEATUNTILTIME>300:ENDPROC

1590 DEFPROCcont

1600 PRINTTAB(1,19)"Press the space bar to continue."

1610 REPEATUNTILGET=32:CLS

1620 ENDPROC

1630 DEFPROCend

1640 *FX15,0

1650 VDU23:0202:0;0;0;

1660 VDU19,2,4,0,0,0,19,3,3,0,0,0

1670 PROCcircle(300,600,200,3)

Attributes Trail listing

From Page 19

```

1680 PROCcircle(900,600,20
0,3)
1690 PROCcircle(200,650,50
,2)
1700 PROCcircle(400,650,50
,2)
1710 PROCcircle(800,650,50
,2)
1720 PROCcircle(1000,650,5
0,2)
1730 PROCcircle(300,600,40
,1)
1740 PROCcircle(900,600,40
,1)
1750 PROCsmile(300)
1760 IF scoreone>scoretwo
X PROCsmile(900) ELSE PROCs
ad
1770 IF scoreone>scoretwo
X PRINTTAB(2,22);name$(1)TA
B(2,24)"scored"TAB(2,26);sc
oreoneX ELSE PRINTTAB(2,22)
;name$(2)TAB(2,24)"scored"
AB(2,26);scoretwoX
1780 IF scoreone>scoretwo
X PRINTTAB(12,22);name$(2)T
AB(12,24)"scored"TAB(12,26)
;scoretwoX ELSE PRINTTAB(12
,22);name$(1)TAB(12,24)"sc
ored"TAB(12,26);scoreoneX
1790 PRINTTAB(3,29)"SPACE
TO PLAY"
1800 REPEATUNTILGET=32
1810 ENDPROC
1820 DEFPROCcircle(X,Y,r
adX,colI)
1830 VDU29,X,Y;
1840 GCOL0,colI
1850 MOVE0,radI
1860 FORangleI=0TO360STEP2
0
1870 upI=SINRAD(angleI)*ra
dI
1880 acrossI=COSRAD(angleI
)*radI
1890 MOVE0,0:PLOT05,upI,ac
rossI
1900 NEXT

```

```

1910 ENDPROC
1920 DEFPROCsmile(XI)
1930 VDU29,XI;600;
1940 GCOL0,1
1950 radI=150
1960 MOVESINRAD(110)*150,C
OSRAD(110)*150
1970 FORangleI=110TO250STE
P10
1980 upI=SINRAD(angleI)*ra
dI
1990 acrossI=COSRAD(angleI
)*radI
2000 DRAWupI,acrossI
2010 NEXT
2020 ENDPROC
2030 DEFPROCsad
2040 VDU29,900;400;
2050 GCOL0,0
2060 radI=150
2070 MOVESINRAD(300)*150,C
OSRAD(300)*150
2080 FORangleI=300TO420STE
P10
2090 upI=SINRAD(angleI)*ra
dI
2100 acrossI=COSRAD(angleI
)*radI
2110 DRAWupI,acrossI
2120 NEXT
2130 ENDPROC
2140 MODE6
2150 VDU19,0,4;0;
2160 REPORT:PRINT" at line
";ERL
2170 *FX12
2180 *FX4,0
2190 END
2200 REM downloader
2210 *KEY0 *T:INDI=PAGE-&E
00:FORI=PAGE TO TOP STEP4:
!(IX-DX)=!IX:NEXT:!(TOP-DX)
=&FF0D:PAGE=&E00:INOLD:NRUN:
N
2220 *FX138,0,128

```

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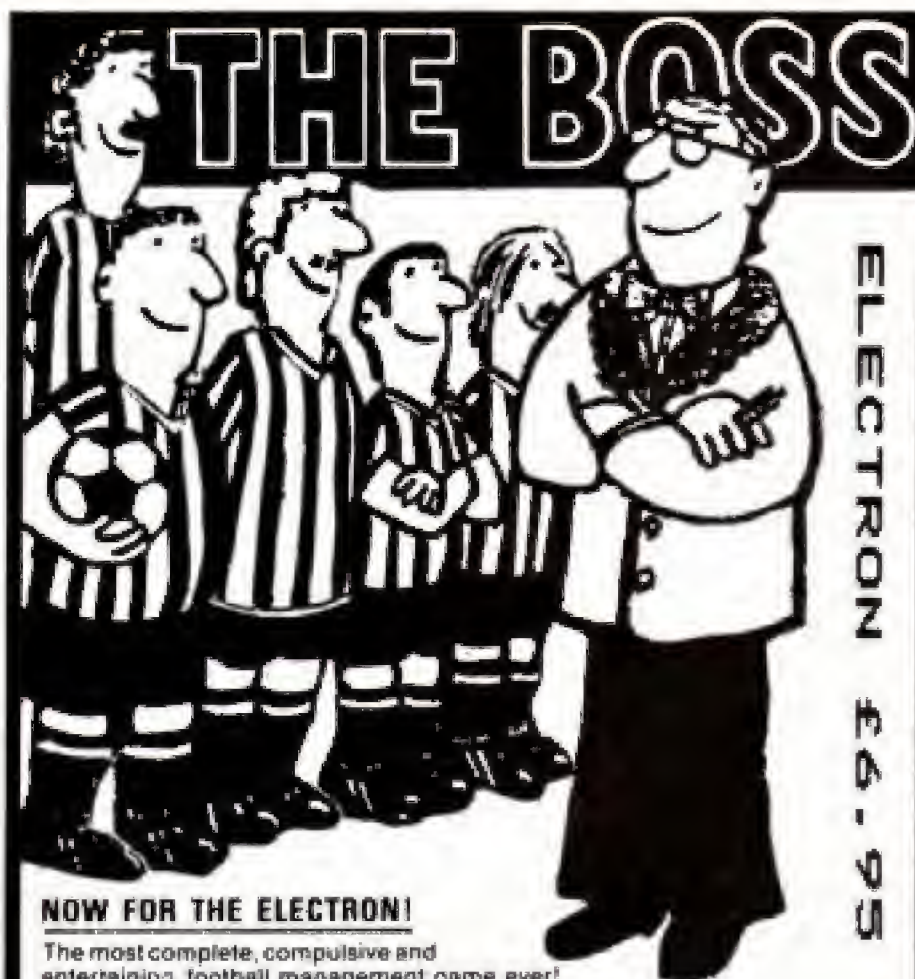
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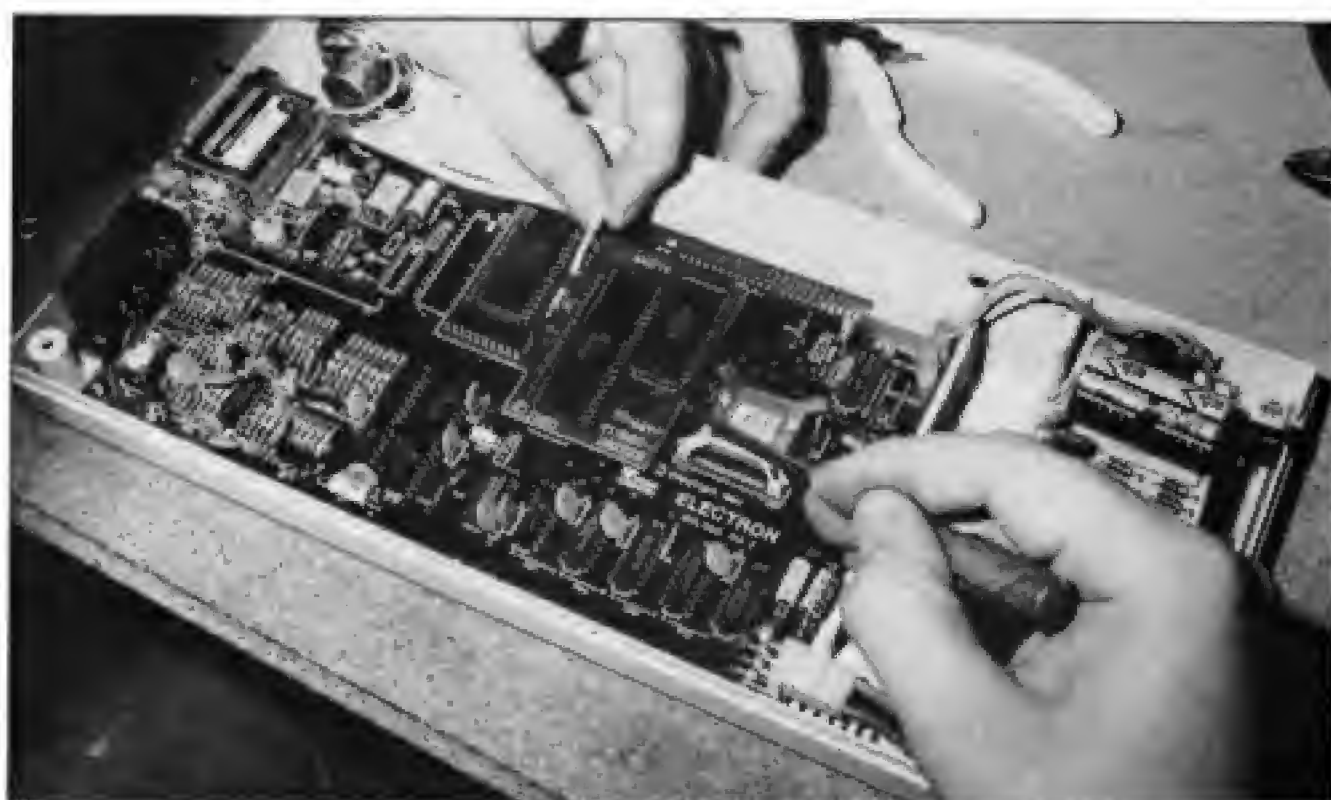
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Putting Electron into turbo-drive

THE Electron has acquired an unfortunate reputation as being a slow micro, but this actually isn't so. For instance it's much faster than its competitor, the Sinclair Spectrum.

This misconception has arisen through living in the shadow of its big brother, the BBC Micro. Any home computer compared with this will seem slower.

This won't placate Electron users though — they want their machine to be every bit as good as the BBC Micro. Now Slogger has come to the rescue and you can give your Electron a big boost in speed with an Elk Turbo-Driver.

The Turbo-Driver is a small board which fits inside the Electron. Apart from a switch on the side of the case

there's no indication that it's there. Flick the switch up and you're in turbo mode, flick it down and you're back to normal.

The board plugs into the 6502 processor and Basic sockets on the main circuit board. It's quite easy to fit to very early Electrons since both chips are simply plugged into their sockets.

Most Electrons however have the chips soldered in and getting them out isn't too easy. Send your machine to Slogger and they will fit the board and return it within seven days — quite an impressive service.

So how good is the Turbo-Driver? In Table 1 you'll see the results of five speed tests when run on a standard

ROLAND WADDILOVE
looks at the exciting potential of Slogger's Elk Turbo-Driver

Electron, Turbo Electron and BBC Micro.

Test 1 is a simple maths program calculating SIN, COS and TAN. The BBC Micro comes out on top as you'd expect, but the Turbo is a very close second with the standard Electron taking half as long again, so there's a significant increase in speed.

Test 2 is the same as Test 1, the only difference being that Test 1 was run in Mode 6 and Test 2 in Mode 1.

The results clearly show a drastic reduction in the performance of the standard Electron. It ran almost three times slower than the BBC Micro and Turbo, which were unaffected by the mode change.

Tests 3 and 4 are again identical, except that Test 3 runs in Mode 6 and Test 4 in Mode 1. An array is dimensioned and filled with a value.

Notice that the BBC Micro is again quickest, with the Turbo close behind, and that there's little difference between Mode 6 and 1. The standard Electron is only slightly slower in Mode 6, but again it's three times slower in Mode 1.

Test 5 is a graphics program running in Mode 2. The BBC Micro easily wins with the Turbo not far behind. The standard Electron is three times slower, as before.

These simple tests clearly show that a BBC Micro is still slightly faster than a Turbo Electron, although you probably won't notice the difference.

The speed increase over a standard Electron varies depending on what it is doing and in which mode it is running. You'll see the biggest difference in Modes 0 to 3,

Test	Standard Electron	Turbo Electron	BBC Micro
1	16.42	11.06	10.05
2	41.49	11.06	10.05
3	11.73	8.23	7.37
4	29.35	9.31	7.38
5	22.85	7.73	4.9

Table 1: Results of the speed tests in seconds

Benchmarks are all well and good, but they don't tell the whole story. What is the Turbo like in normal use? A common question we get asked is: "If I buy the Slogger Turbo will I be able to run all BBC software as long as it doesn't use Mode 7?" The answer to this is definitely no.

All the Turbo does is to speed up the Electron – nothing more, nothing less. If a game doesn't run on a standard Electron it won't run on a Turbo Electron either.

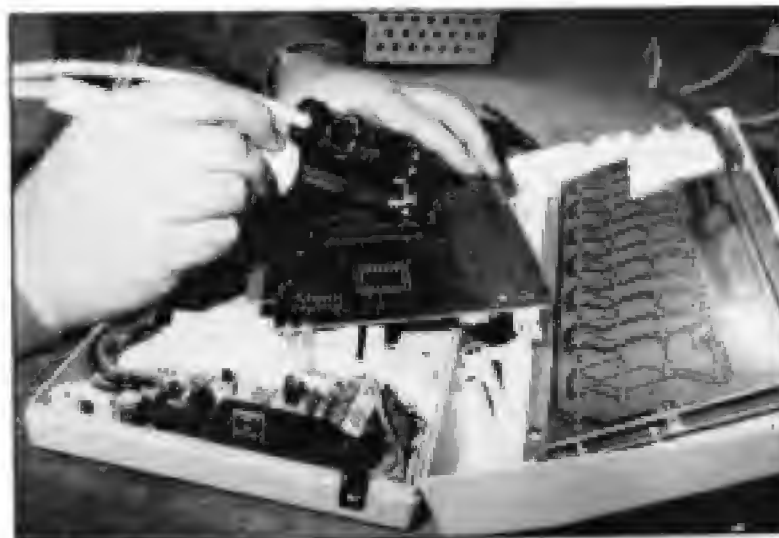
If a BBC game crashes after running for one minute on a standard Electron it will crash after 20 seconds on a Turbo Electron because it's running three times faster.

However, much Electron software is improved and given new life by the boost in speed supplied by the Turbo. It puts extra zip into the cars in Frogger, the aliens are meaner in Space Invaders and the

ghosts in Pac Man seem jet propelled.

Some games are simply too fast now. Alligator's Blagger and Tynesoft's Mousetrap are unplayable. This is why there's a switch on the side of the Electron to set it back to normal speed.

Aardvark's Frak! and one or two other games still run at the same speed and the Turbo makes no difference at all.



Some BBC software does work on the standard Electron, but the games run so slowly they aren't much fun at all. For instance Ghouls of Azzod, Morris Minor and USS Endeavour are three superb games from recent issues of *The Micro User* that all run on the Electron.

However they're so slow I can't imagine anyone wanting to play them. All these games

run at their normal speed on a Turbo Electron and are great fun to play.

So it's fair to say that the Turbo instantly increases the amount of software available for the Electron, though it doesn't turn your Electron into a BBC Micro.

To sum up, the Turbo-Driver increases the speed of the Electron by up to 300 per cent depending on what it is doing. Much Electron software benefits by the increase in speed and the Turbo can be switched off for the rest. BBC Micro software which runs but is unplayable because of its slow speed now runs at the proper speed.

Having used a Turbo Electron I can't bear the thought of going back to my old slow version. This upgrade should have been standard on all Electrons. I'd like to know why Acorn didn't think of this when it was designing the original.

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DOUBLE PHANTOM?

YES! This IS the program demonstrated on BBC TV's "Micro Live". The Worlds first micro multi-user combat flight simulation is now available direct from DOCTOR SOFT via our 'HOT LINE' FIRST CLASS MAIL ORDER service.

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NOW that we've got the hang of creating and using our own Basic keywords, let's round off this series by implementing the powerful WHILE . . . WEND facility that BBC Basic lacks.

You will probably be familiar with FOR . . . NEXT and REPEAT . . . UNTIL loop structures, having used them several times in most of your programs.

But have you ever felt that neither FOR . . . NEXT nor REPEAT . . . UNTIL were quite what you wanted for a particular piece of code?

Sometimes you need a little extra. To see why, let's have a quick look at these two structures.

FOR . . . NEXT is a loop that will execute a fixed number of times. For example, the following program will loop exactly 100 times:

```
10 FOR X=1 TO 100
20 PRINT X
30 NEXT X
40 END
```

This is all very well unless you want to be able to break out of the loop for any reason. Perhaps you want the user to have the option of pressing the spacebar to stop. You could allow for this in the following way but it is sloppy programming:

```
10 FOR X=1 TO 100
20 PRINT X
30 IF INKEY$(0)=" "
40 THEN X=100
50 NEXT X
60 END
```

Obviously the way we get round this on the BBC Micro is to use a REPEAT . . . UNTIL loop, as in the following:

```
10 X=0
20 REPEAT X=X+1
30 PRINT X
40 UNTIL X=100 OR
50 INKEY$(0)=" "
```

Yet there is still a limitation here. Supposing you hold

the spacebar down right from the start of program execution. No matter what we do X will still reach a value of 1 which will be printed out.

Admittedly you would have to have fast reflexes to hit the spacebar immediately after running the program, but this is only an example. Anyway, how could we stop this happening?

This is where WHILE . . . WEND comes into its own. Have a look at this program:

```
10 X=0
20 WHILE X<100 AND
30 INKEY$(0)<>" "
40 X=X+1
50 PRINT X
60 WEND
70 END
```

The difference between this and a REPEAT . . . UNTIL loop is that the condition is checked before the instructions inside the loop are executed rather than after.

So if the condition after the WHILE in line 20 is true the instructions inside the loop will be executed, and if the condition is false program execution will jump to the next WEND.

In many cases you want a number of things to happen when a certain condition is true. In Fortran you would use

IF and END IF. This is similar to Basic's IF, except that if the condition following the IF is true all instructions following it are executed until an END IF is encountered.

So you can see that WHILE . . . WEND can be used as a multi-line IF, for example:

```
10 X=0
20 Y=100
30 Z=1000
40 WHILE X<100 AND Y>50
50 AND Z<1200
60 X=X+1
70 Y=Y-1
80 Z=Z+2
90 PRINT X,Y,Z
100 WEND
110 END
```

Lines 50-80 could have been made into a multi-statement line, but I think it is easier to follow a program which has as few multi-statement lines as possible.

You might argue that you could use the following structure putting the statements to be executed in PROCb, as below:

IF a THEN PROCb

You would be right, but then, that would be your personal choice. If I were debugging a program with a large number of procedures in it I would have to keep going

backwards and forwards to follow the flow of the program. Using WHILE . . . WEND the program flow is kept up.

I am not saying that you could or should replace all procedures with WHILE . . . WEND as, for example, you would not have local variables or be able to pass parameters.

But careful use of WHILE . . . WEND can make programs easier to write and to follow. The actual decision whether to call a separate procedure or simply code through is more a matter of art than science.

To use WHILE . . . WEND in your programs type in the listing of that name and then save it. When you run it it assembles the object code at &B00 which is then saved to tape or disc as a file called WW. To use this in future type:

*RUN WW

By the way, with this utility you can't have nested WHILE . . . WEND loops. But to make up for this if you use WHILE . . . WEND in a program and press Escape you can go back to the last WHILE statement by simply typing WEND.

Thus you have the added bonus of something similar to CONT (or continue) which the BBC Micro does not have.

Now to how it works. Lines 100 to 1490 will be familiar from my last article. They trap the Break (BRK) vector and check whether one of our new keywords has caused the error.

Lines 1530 to 1590 contain the new keyword table

which holds the keywords and action addresses of WHILE and WEND.

Lines 1630 to 1810 store the present position of PTRB when a WHILE is encountered. This is to enable us to continue execution at this position at a later point.

Lines 1850 to 1960 use a ROM routine—the one used by EVAL—to test the condition

following the WHILE.

If it is true execution jumps to true.

If the condition is not true lines 2000 to 2130 look for a matching WEND.

When it has been found, the location following it is stored so that program execution is made to continue from there.

If the condition following the WHILE was true lines

2170 to 2230 set PTRB to the start of the lines between the WHILE and WEND, which must now be interpreted.

Thereafter whenever a WEND is encountered lines 2270 to 2430 force execution to jump to the condition following the last WHILE and evaluate it—we've already stored this in lines 1630 to 1810. Thus the process con-

tinues, jumping back to test the conditions following each WHILE whenever a WEND is found, until finally that condition is not true, when we drop out of the loop.

This is the last in the present series. I hope you have found it useful and look forward to seeing any extra keywords and routines you come up with.

```

100 REM *****
110 REM *
120 REM * WHILE..WEND *
130 REM *
140 REM * By Robin *
150 REM * Nixon *
160 REM *
170 REM * (c) Electron *
180 REM * User *
190 REM *
200 REM *****
210 REM
220 MODE 0
230 osrch=&FFEE
240 osbyte=&FFF4
250 checkend=&9B57
260 continue=&8B9B
270 evalexpr=&9B29
280 FOR PASS=0 TO 3 STEP 1
290 PT=&B00
300 [
310 OPT PASS
320 \
330 .start
340 \
350 LDA &202
360 LDX &203
370 CMP #main MOD &100
380 BNE changebrkvector
390 CPX #main DIV &100
400 BEQ alreadychanged
410 \
420 .changebrkvector
430 \
440 STA &70
450 STX &71
460 LDA #main MOD &100
470 STA &202
480 LDA #main DIV &100
490 STA &203
500 \
510 .alreadychanged
520 \
530 RTS

540 \
550 .main
560 \
570 PHP
580 PHA
590 TYA
600 PHA
610 TXA
620 PHA
630 LDY #0
640 LDA (&FD),Y
650 CMP #4
660 BEQ checkcommand
670 \
680 .notcommand
690 \
700 PLA
710 TAX
720 PLA
730 TAY
740 PLA
750 PLP
760 JMP (&70)
770 \
780 .checkcommand
790 \
800 LDA &A
810 CLC
820 ADC &B
830 STA &B0
840 LDA &C
850 ADC &B
860 STA &B1
870 SEC
880 LDA &B0
890 SBC #1
900 STA &B0
910 LDA &B1
920 SBC #0
930 STA &B1
940 LDA #keytable MOD &100
950 STA &B2
960 LDA #keytable DIV &100
970 STA &B3

980 \
990 .comloop
1000 \
1010 LDY #0
1020 \
1030 .comloop1
1040 \
1050 LDA (&B2),Y
1060 BEQ found
1070 CMP #5B
1080 BEQ notcommand
1090 CMP (&B0),Y
1100 BNE next
1110 INY
1120 JMP comloop1
1130 \
1140 .next
1150 \
1160 JSR incmatch
1170 BNE next
1180 JSR incmatch
1190 JSR incmatch
1200 JSR incmatch
1210 JMP comloop
1220 \
1230 .found
1240 \
1250 STY &B6
1260 INY
1270 LDA (&B2),Y
1280 STA &B4
1290 INY
1300 LDA (&B2),Y
1310 STA &B5
1320 LDA # (quit-1) DIV &100
1330 PHA
1340 LDA # (quit-1) MOD &100
1350 PHA
1360 JMP (&B4)
1370 \
1380 .incmatch
1390 \
1400 LDA &B2
1410 CLC

1420 ADC #1
1430 STA &B2
1440 LDA &B3
1450 ADC #0
1460 STA &B3
1470 LDY #0
1480 LDA (&B2),Y
1490 RTS
1500 \
1510 .keytable
1520 \
1530 EQU "WHILE"
1540 EQU 0
1550 EQU while
1560 EQU "WEND"
1570 EQU 0
1580 EQU wend
1590 EQU 5B
1600 \
1610 .while
1620 \
1630 LDX #1
1640 STX &B6
1650 DEX
1660 \
1670 .incwhile
1680 \
1690 JSR get
1700 INX
1710 CPX #4
1720 BNE incwhile
1730 LDA &A
1740 STA &10
1750 STA &B0
1760 LDA &B
1770 STA &19
1780 STA &B0E
1790 LDA &C
1800 STA &1A
1810 STA &B0F
1820 \
1830 .while1

```


Extra Commands listing

From Page 27

1840 \	2080 BNE findwend	2340 INX	2600 DEC &B6
1850 JSR evalexpr	2090 JSR get	2350 CPX #3	2610 LDA &B6
1860 LDA &2A	2100 CMP #ASC'D'	2360 BNE incwend	2620 CLC
1870 BNE true	2110 BNE findwend	2370 LDA &B0	2630 ADC &A
1880 LDA &1B	2120 INC &A	2380 STA &1B	2640 STA &A
1890 CLC	2130 RTS	2390 LDA &B8E	2650 JSR checkend
1900 ADC &19	2140 \	2400 STA &19	2660 PLA
1910 STA &B	2150 .true	2410 LDA &BF	2670 PLA
1920 LDA &1A	2160 \	2420 STA &1A	2680 PLA
1930 ADC #0	2170 LDA &1B	2430 JMP while1	2690 PLA
1940 STA &C	2180 STA &A	2440 \	2700 PLA
1950 LDA #0	2190 LDA &19	2450 .get	2710 PLA
1960 STA &A	2200 STA &B	2460 \	2720 PLA
1970 \	2210 LDA &1A	2470 LDA &B	2730 PLA
1980 .findwend	2220 STA &C	2480 CLC	2740 PLA
1990 \	2230 RTS	2490 ADC #1	2750 JMP continue
2000 JSR get	2240 \	2500 STA &B	2760]
2010 CMP #ASC'W'	2250 .wend	2510 LDA &C	2770 NEXT
2020 BNE findwend	2260 \	2520 ADC #0	2780 DSCL1 (*SAVE WM *+STR\$*P2)
2030 JSR get	2270 LDY #1	2530 STA &C	
2040 CMP #ASC'E'	2280 STY &B6	2540 LDY #0	
2050 BNE findwend	2290 DEX	2550 LDA (&B),Y	
2060 JSR get	2300 \	2560 RTS	
2070 CMP #ASC'N'	2310 .incwend	2570 \	
	2320 \	2580 .quit	
	2330 JSR get	2590 \	

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If you beat him the door to your pet dragon's cave is raised a little. If you're not quick enough your opponent gains the advantage instead.

After winning several times the door will be high enough for one of the dragons to emerge. He'll race out and destroy the opposing player.

Are your reactions fast enough to avoid the fiery fate that awaits you?

The keys are Z for player 1 and / for player 2.

The program is fairly long for a Mode 1 game, so leave out all unnecessary spaces when entering the listing or you'll run out of memory. The space following the line number isn't needed so miss it out.



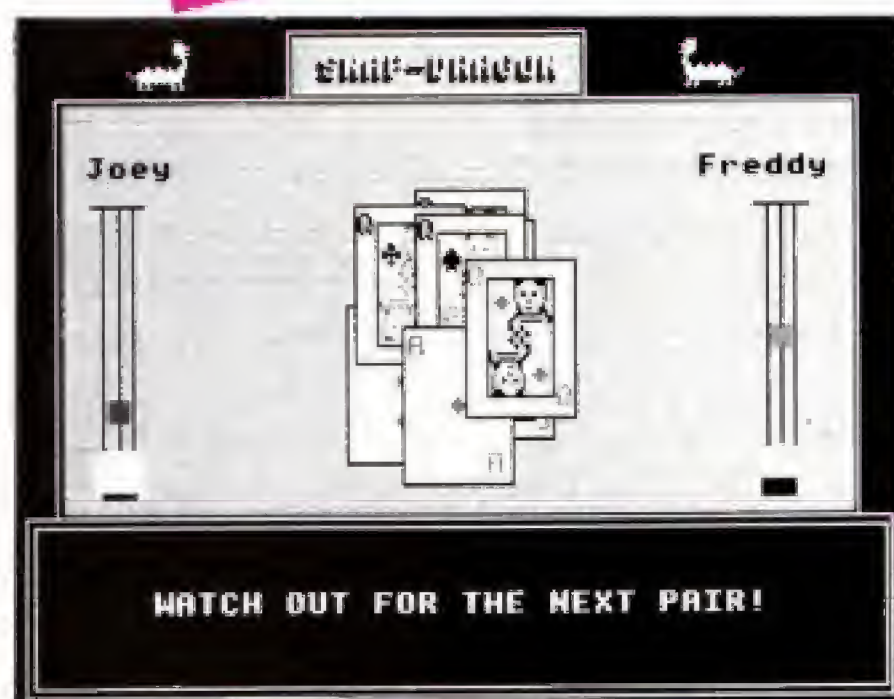
MAIN VARIABLES

X1%,Y1% Player 1's lift coordinates.
 X2%,Y2% Player 2's lift coordinates.
 X%,Y% Graphics window coordinates for card background, colour.
 GC Court card colours.
 C Card value.
 SUIT Card suit.
 dc% Card counter.
 D1%,D2% Dragon's cave coordinates.

By **PHILIP ORD** and
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PROCEDURES

setup Inputs players' names and sets up screen.
chars Defines characters and deletes flashing cursor.
init Sets initial values for all variables used.
select_card Uses information from PROCdata to select card and suit. Also defines correct colours.
shuffle Shuffles the deck after every 52 cards.
key Tests for keypress and acts accordingly.
snap1 If keypress is valid, moves lift of player 1 and enlarges left hand cave entrance.
snap2 Moves lift of player 2 and enlarges right hand cave entrance.
invalid If cards do not match when key is pressed a warning message is printed.
display Creates random colour and sound display.
win Congratulates winner and offers a new game.
data Generates a random number between 1 and 52 inclusive to produce from the data statements, a different card and suit value.



**Full listing starts
 on Page 30**

From Page 29

```

10 REM Snap Dragon
20 REM By P.Ord/K.Owens
30 REM (c) Electron User
40 IF PAGE>=900 GOTO1410
50 DIM N1$(52),C(52),SUIT
(52):*FX16
60 MODE1:VDU23,1,0;0;0;0
:VDU7:PRINTTAB(10,16)*INST
RUCTIONS Y or N?:M$=SET$:I
F M$<>"Y" AND M$<>"N" GOTO6
0
70 CLS:IF M$="Y"PROCinst
:CLS:VDU20
80 ZX=0:PROCdragon:VDU5:
MOVE160,852:VDU224,225,226,
8,11,227:MOVE960,852:VDU11,
228,8,10,229,230,231
90 PROCchars:N=0
100 PROCinit:PROCdata:PRO
Cset_up:GOTO230
110 DEF PROCset_up
120 MOVE54,256:DRAW54,810
:DRAW1223,810:DRAW1223,256:
DRAW54,256:MOVE10,22:DRAW10
,256:DRAW1270,256:DRAW1270,
22:DRAW10,22:MOVE20,32:DRAW
20,246:DRAW1260,246:DRAW126
0,32:DRAW20,32:MOVE395,812:
DRAW395,898:DRAW826,898:DRA
W826,812
130 VDU19,2,2;0;:VDU24,40
0;817;816;880;:BCOL0,130:CL
6
140 X=432:Y=856:FOR I=1 T
O 10:X=X+1:Y=Y+1:MOVEX,Y:GC
OL0,0:PRINT"SNAP-DRAGON":NE
XT:MOVEX,Y:GCOL0,3:PRINT"SN
AP-DRAGON"
150 VDU4:VDU20,1,29,38,25
:COLOUR128:CLS:VDU5:VDU24,6
4;264;1213;880;:BCOL0,130:CL
6
160 IF N=0 MOVE96,600:CL6
:VDU7:INPUT"WHAT IS YOUR NA
ME PLAYER 1"N1$:MOVE96,500:
VDU7:INPUT"WHAT IS YOUR NAM
E PLAYER 2"N2$:CL6
170 BCOL0,0:MOVE166,350:D
RAW166,670:MOVE123,350:DRAW
123,670:MOVE1088,350:DRAW10
88,670:MOVE1131,350:DRAW113
1,670:MOVE105,670:DRAW103,6
70:MOVE1070,670:DRAW1140,67
0
180 MOVE144,670:DRAW144,3
82:MOVE1109,670:DRAW1109,38

```

```

2:MOVEX1X,Y1X:VDU18,0,1,228
:MOVEX2X,Y2X:VDU228
190 AX=1181-(LEN(N2$)*32)
200 BCOL0,0:MOVE96,735:PR
INT;N1$:MOVEAX,735:PRINT;N2
$
210 VDU24,115;286;179;346
:BCOL0,131:CL6:VDU24,1075;
286;1139;346;:CL6
220 ENDPROC
230 VDU4:CLS:VDU7:PRINTTA
B(1,2)*PRESS THE SPACEBAR T
O START THE DEAL*:REPEAT UN
TIL GET=32:CLS
240 PROCprint:PROCselect_
card:PROCcard:PROCkey:GOTO2
40
250 DEFPROCchars
260 VDU23,224,54,127,127,
127,62,20,0,0,23,225,0,20,2
8,107,127,107,0,20,23,226,0
,20,62,127,62,20,0,0,23,227
,0,20,62,127,127,127,20,62
270 VDU23,228,255,255,255
,255,255,255,255,255,23,229
,0,94,82,82,82,82,82,94,23,
231,254,252,0,232,72,0,24,1
6
280 VDU23,232,60,255,63,2
55,252,120,64,192,23,233,64
,223,192,111,56,56,16,16,23
,234,1,243,6,252,24,216,0,1
36,23,235,32,34,39,32,32,60
,62,0
290 VDU23,236,132,36,116,
4,4,20,60,0,23,237,16,32,64
,255,64,32,16,0,23,238,0,4,
2,255,2,4,0,0,23,239,16,19,
40,47,32,59,196,223
300 VDU23,240,31,20,159,2
25,7,188,65,241,23,241,12,1
2,51,51,204,204,51,51,23,24
2,204,204,51,51,204,204,40,
40,23,243,143,130,189,224,
135,232,249,56
310 VDU23,244,251,35,220,
4,246,12,200,0,23,245,0,24,
16,18,23,16,63,127,23,246,1
36,140,132,36,116,4,254,255
,23,247,0,60,56,32,32,46,36
,33
320 VDU23,248,0,124,60,4,
4,228,60,4,23,249,17,16,27,
24,63,96,207,128,23,250,0,8
,156,20,246,3,251,2,23,251,
3,2,14,63,255,254,254,60
330 VDU23,252,90,90,126,2
4,24,60,36,36,23,253,255,12

```



```

7,32,46,36,33,49,17,23,1,0;
0;0;0;
340 ENDPROC
350 DEFPROCinit
360 X1X=128:X2X=1093:Y1X=
382:Y2X=382:daX=0:D1X=206:D
2X=206
370 ENVELOPE1,1,10,3,3,15
,1,19,126,0,0,-126,126,126:
ENVELOPE2,1,6,4,6,6,2,6,126
,0,0,-126,126,126:ENVELOPE3
,1,19,-4,0,3,13,20,126,0,0,
-126,126,126:ENVELOPE4,1,29
,3,3,13,20,40,126,0,0,-126,
126,126
380 ENVELOPE5,1,1,-0,0,10
,5,-11,126,0,0,-126,126,126
390 ENDPROC
400 DEFPROCselect_card
410 daX=daX+1:IF daX>52 P
ROCshuffle:daX=0:PROCdata:G
OTO240
420 C=C(N1(daX)):SUIT=SUI
T(N2(daX)):suit$=CHR$(SUIT+
223)
430 IFSUIT=1ORSUIT=3colou
r=1:BC=0ELSEIFSUIT=2ORSUIT=
4colour=0:BC=1
440 X1=440+(RND(20)*10):Y
1=600-(RND(20)*10):VDU5:BCO
L0,colour
450 VDU24,X1,Y1-197:X1+16
0,Y1+10:BCOL0,131:CL6:BCOL
0,0:MOVEX,Y1+10:DRAWX1+160
,Y1+10:DRAWX1+160,Y1-197:DR

```

```

AWX1,Y1-197:DRAWX1,Y1+10:BC
OL0,colour
460 ENDPROC
470 DEF PROCshuffle
480 VDU7:VDU24,455;290;85
0;695;:BCOL0,130:CL6:VDU4:P
RINTTAB(2,2)*HANG ON WHILE
I SHUFFLE THE CARDS*:FOR D=
1 TO 1000:NEXT:SOUND0,3,200
,40:SOUND0,0,0,10:SOUND0,3,
200,40:FOR D=1 TO 2500:NEXT
:CLS:VDU5
490 ENDPROC
500 DEF PROCkey
510 VDU24,64;320;1213;880
:*FX21
520 M$=INKEY$(50+RND(100)
)
530 IF M$="Z" M$=N1$:PROC
snap1:IF Y1X>650 PROCdragon
:time=600:PROCdisplay:PROCw
in
540 IF M$="/" M$=N2$:PROC
snap2:IF Y2X>650 PROCdragon
:time=600:PROCdisplay:PROCw
in
550 IF M$="" AND C(N1(daX
))=C(N1(daX-1)) THEN VDU4:CL
6:SOUND1,2,25,25:A$="PAY A
TTENTION "+N1$+" AND "+N2$:
PRINTTAB(19-(LENA$/2),1);A$
;TAB(6,3)*YOU'VE JUST MISSE
D A PAIR*:FOR D=1 TO 3000:N
EXT:CLS:PROCprint
560 ENDPROC

```



```

570 DEF PROCsnap1
580 IF C(NX(dx)) < C(NX(dx-1)) THEN PROCinvalid:END
PROC
590 VDU4:CLS:PRINTTAB(16,
2)"SNAP!!":VDU5
600 SOUND1,4,200,40:time=
200:PROCdisplay:VDU4:CLS:VD
U5
610 GCOL0,1:MOVEIX,YIX+3
2:VDU228:GCOL0,2:MOVEIX,YI
X:VDU228:YIX=YIX+32:MOVE144
,670:GCOL0,0:DRAWIX+16,YIX
:MOVE144,350:DRAWIX+16,YIX
-32
620 DIX=DIX+5:VDU24,120;2
86;169;DIX:GCOL0,128:CL6
630 ENDPROC
640 DEF PROCsnap2
650 IF C(NX(dx)) < C(NX(dx-1)) THEN PROCinvalid:END
PROC
660 VDU4:CLS:PRINTTAB(16,
2)"SNAP!!":VDU5
670 SOUND1,4,200,40:time=
200:PROCdisplay:VDU4:CLS:VD
U5
680 GCOL0,1:MOVEIX,YIX+3
2:VDU228:GCOL0,2:MOVEIX,YI
X:VDU228:YIX=YIX+32:MOVE110
9,670:GCOL0,0:DRAWIX+16,YI
X:MOVE1109,352:DRAWIX+16,Y
IX-32
690 DIX=DIX+5:VDU24,1000;
286;1129;DIX:GCOL0,128:CL6
700 ENDPROC
710 DEF PROCinvalid
720 SOUND1,2,10,40
730 VDU4:CLS:B$="YOU NEE
D AN EYE TEST "+N$:PRINTTAB
(5,1)"THE LAST 2 CARDS DON'
T MATCH"TAB(19-(LENB$/2),3)
;B$:FOR D=1 TO 2000:NEXT:CLS
:PROCprint
740 ENDPROC
750 DEF PROCdisplay
760 TIME=0:REPEAT:VDU19,R
ND(3),RND(14);0;SOUND1,-15
,RND(200),1:UNTIL TIME>time
:VDU20,19,2,2;0;
770 FOR D=1 TO 1000:NEXT
780 ENDPROC
790 DEF PROCwin
800 VDU4:CLS:PRINTTAB(11,
1)"WELL DONE "+N$:TAB(9,3)"
ANOTHER GAME Y or N?"
810 W$=GET$:IF W$<>"Y" AN
D W$<>"N" GOTO 810

```

```

820 IF W$="Y" RUN ELSE CL
S:END
830 ENDPROC
840 DEFPROCdata
850 FORIX=1TO52:NX(IX)=IX
:NEXT:FORIX=52TO2STEP-1:CX=
RND(IX):TX=NX(CX):NX(CX)=NX
(IX):NX(IX)=TX:NEXTIX
860 RESTORE
870 FORI=1TO52
880 READC(I),SUIT(I)
890 NEXT
900 ENDPROC
910 DATA1,1,11,1,2,1,11,2
,12,2,13,2,3,2,12,3,13,4,2,
3,4,2,1,4,3,4,12,1,3,1,1,2,
2,2,13,1,12,2,2,3,13,3,11,3
,13,4,3,3,12,4,11,4
920 DATA13,1,11,1,4,1,12
,1,11,3,1,3,3,2,13,3,1,3,2,
4,4,3,3,4,2,4,2,1,1,1,11,2,
3,1,1,2,2,2,13,2,12,3,11,4,
1,4,3,3,12,4,4,4
930 DEF PROCprint
940 VDU4:PRINTTAB(5,2)"WA
TCH OUT FOR THE NEXT PAIR!"
:VDU5:ENDPROC
950 DEFPROCcard
960 GCOL0,0:MOVEIX,YIX+10;
DRAWIX+160,YIX+10:DRAWIX+160
,YIX-197:DRAWIX,YIX-197:DRAWI
X,YIX+10:GCOL0,colour
970 SOUND411,-15,RND(200)
,1
980 IF C=1 GOSUB 1000 ELS
E IF C=2 GOSUB 1010 ELSE IF
C=3 GOSUB 1020 ELSE IF C=4
GOSUB 1030 ELSE IF C=11 G
OSUB 1040 ELSE IF C=12 GOSUB
1050 ELSE IF C=13GOSUB 106
0
990 ENDPROC
1000 MOVEIX+120,YIX-155:VDU
65:PROC1:MOVEIX+5,YIX:VDU65:
RETURN
1010 PROCc:PROC2:RETURN
1020 PROCc:PROC2:PROC1:RET
URN
1030 PROCc:PROC3:RETURN
1040 PROCj:RETURN
1050 PROCq:RETURN
1060 PROCk:RETURN
1070 DEF PROCc
1080 MOVEIX+5,YIX:VDU40+C:M
OVEIX+123,YIX-160:VDU40+C:EN
DPROC
1090 DEF PROC1
1100 MOVEIX+64,YIX-80:PRINT

```

```

suit$:ENDPROC
1110 DEF PROC2
1120 MOVEIX+64,YIX-20:PRINT
suit$:MOVEIX+64,YIX-132:PRIN
Tsuit$:ENDPROC
1130 DEF PROC3
1140 MOVEIX+28,YIX-20:PRINT
suit$:MOVEIX+28,YIX-132:PRIN
Tsuit$:MOVEIX+98,YIX-20:PRIN
Tsuit$:MOVEIX+98,YIX-132:PRI
NTsuit$:ENDPROC
1150 DEF PROCj
1160 MOVEIX+1,YIX:VDU74:MOV
EXI+131,YIX-160:VDU74
1170 MOVEIX+65,YIX-14:VDU18
,0,6C,253,231,8,8,10,239,24
0,8,8,8,10,18,0,2,241,18,0,
6C,241,8,242,18,0,2,242,8,8
,8,10,18,0,6C,243,244,8,8,1
0,245,246:PROCdraw:ENDPROC
1180 DEF PROCq
1190 MOVEIX+1,YIX:VDU81:MOV
EXI+131,YIX-160:VDU81
1200 MOVEIX+65,YIX-14:VDU18
,0,6C,247,248,8,8,10,249,25
0,8,8,8,10,18,0,2,241,18,0,
6C,241,8,242,18,0,2,242,8,8
,8,10,18,0,6C,233,234,8,8,1
0,235,236:PROCdraw:ENDPROC
1210 DEF PROCk
1220 MOVEIX+1,YIX:VDU75:MOV
EXI+131,YIX-160:VDU75:GOTO11
70
1230 DEFPROCdraw
1240 MOVEIX+32,YIX-14:GCOL0
,0:DRAWIX+130,YIX-14:DRAWIX+
130,YIX-171:DRAWIX+32,YIX-171
:DRAWIX+32,YIX-14
1250 GCOL0,colour:MOVEIX+3
6,YIX-35:PRINT:suit$:MOVEIX+
92,YIX-130:PRINT:suit$
1260 ENDPROC
1270 DEF PROCdragon
1280 VDU23,224,1,3,143,95,
47,15,9,13,23,225,17,189,25
5,255,255,255,0,120,23,226,
28,184,240,240,240,240,144,
216,23,227,80,120,126,120,1
26,24,12,12
1290 VDU23,220,10,30,118,3
0,126,24,40,40,23,229,56,29
,31,31,15,15,9,27,23,230,13
6,221,255,255,255,255,0,1,2
3,231,128,192,241,250,244,2
40,144,176
1300 IF IX=0 IX=1:ENDPROC
1310 VDU24,455;290;850;695
:GCOL0,130:CLS

```

```

1320 VDU24,64;264;1213;800
;
1330 IF N$=N1$ MOVE232,318
:VDU18,0,0,224,225,226,8,11
,227: SOUND0,5,2,50:FOP " "
TO 30:GCOL0,RND(3):MO
334: DRAWIX+32,(YIX+10)-RND
(42):NEXT:ENDPROC
1340 IF N$=N2$ MOVE942,318
:VDU18,0,0,11,228,8,10,229,
230,231: SOUND0,5,2,50:FOR I
=1 TO 60:GCOL0,RND(3):MOVE9
42,334: DRAWIX,(YIX+10)-RND
(42):NEXT:ENDPROC
1350 DEF PROCinst
1360 VDU19,3,6;0:COLOUR2:
PRINTTAB(14,1)"INSTRUCTIONS
":COLOUR3:PRINT"The cards
are dealt onto the table on
e""by one. If any card va
lue is the same as""the pr
evious card, then you must
press"
1370 PRINT"your control k
ey ahead of your opponent."
""If you're successful you
r lift will move""up, thus
enlarging the entrance to
the""Dragons den.""Whe
n your lift has reached the
top of"
1380 PRINT"its shaft, you
r Dragon will be released."
""It will then attack your
opponents lift""and destr
oy it with its fiery breath
."
1390 COLOUR2:PRINT""CONTR
OL KEYS:-":COLOUR1:PRINT"
PLAYER 1 ":COLOUR2:PRINT"2
":COLOUR1:PRINT" PLAYER 2
":COLOUR2:PRINT"/""TAB(5)
PRESS SPACE-BAR TO CONTINU
E":REPEAT UNTIL GET=32
1400 ENDPROC
1410 REM Relocate
1420 DX=PAGE-4000:KEY0 *T
,IMFORIX=PAGE TO TOP STEP4:
!(IX-DX)=!IX:NEXT:!(TOP-DX)
=4FF0D:PAGE=4000:MOLD:MRUN:
N
1430 *FX130,0,128

```

This listing is included in this month's cassette tape offer. See order form on Page 53.

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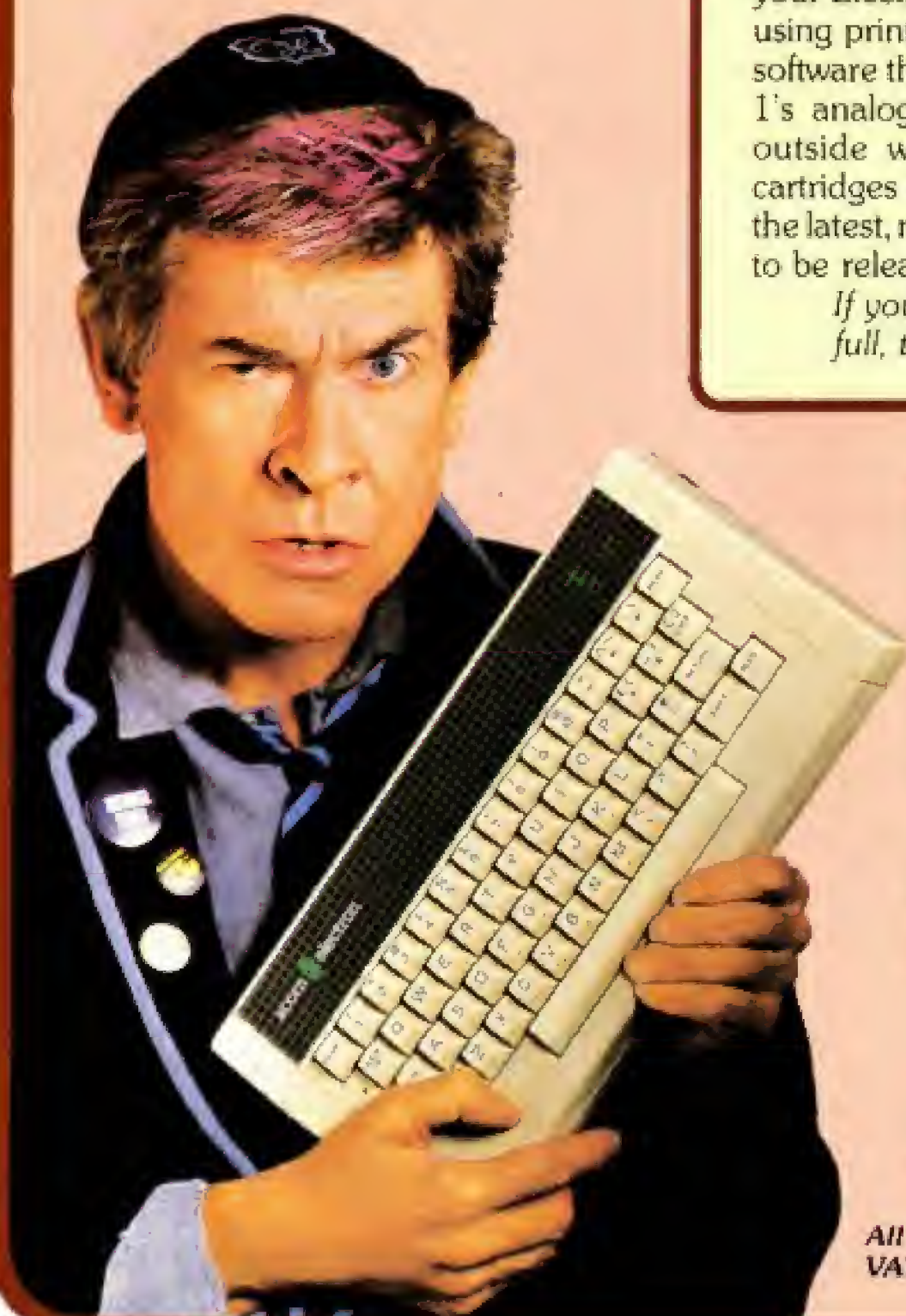
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on Page 61

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Royal Wedding



By **GORDON KEY** and **DAVID McLACHLAN**

TO celebrate the Royal Wedding we've come up with a real teaser—a sliding block puzzle based on the happy occasion.

When you run the program you will be offered a choice of four inbuilt pictures on the

wedding theme or of loading a pre-recorded Mode 2 screen of your own. You will then be presented with the complete picture.

Once you've studied it, shuffle the picture by pressing Space and attempt to solve

the resultant jumble. The keys you'll need to sort it all out are:

- : Move tile up.
- / Move tile down.
- X Move tile to right.
- Z Move tile to left.

Space can be pressed at any time to further shuffle the tiles. Should you give up, pressing Return will undo all your moves and any entered by Space, and the puzzle will be solved for you in a few seconds provided less than 2000 moves have been made.

Pressing Escape at any time will return you to the menu so that you can select another picture.

The program's operation is quite simple. Two short machine code routines are assembled at &110 and &900.

The first is used to move a block or tile by accessing the screen directly, and the second prints large letters.

The screen is split into 16 equally sized tiles which are numbered from 0 to 15.

Two Integer variables, *N%* and *O%*, are then used to pass the new and old tile numbers to the assembly routine via the CALL statement using the parameter block provided in page six by Basic.

The routine also transfers

the contents of the first variable to the second.

Each time a tile is moved—including random moves generated by pressing Space—the move is recorded by PROCsave. This stores four moves in a single byte of memory starting at &A00.

Due to this efficient method



of storage almost 2000 moves can be safely stored.

Pressing Return solves the problem by simply reversing all moves until the picture is restored.

If the computer beeps while you are playing, it means that the available storage memory is full and you have two options.

You can either press Return to solve the puzzle, or press C to continue, but note that Return will no longer solve the puzzle as the counter (*H%*) is zeroed.

If you select option 5 in order to load your own Mode 2

VARIABLES

A%	Flag for PROCmove and a CALL variable for PROCbig.
C%	General purpose for colour value.
D%	Start of data storage for saving moves.
E%	Determines souvenir balloon's speed.
F%	Local flag for FNpic5.
H%	Byte pointer for move storage.
I%	Inkey value and secondary counter.
M%	Call address for the machine code routine.
N%	New tile number (the tile that will be moved).
O%	Old tile number (the number of the blank space).
P%	Bit pointer for move storage.
R%	Value for the radius of the circle drawn by PROCc.
S%	Flag to indicate that at least one move has been saved.
FI%	Number of steps in circle loop.
ST%	Step number.
TY%	Type of circle (filled, not filled, spoked).
COL%	Colour of circle.
c(24)	Cosine array.
s(24)	Sine array.
\$D%	Used by FNpic5 for passing strings to the command line interpreter.

picture this should have been previously saved to tape or disc using the command *SAVE filename 3000+5000.

On selecting this option you are given the choice of entering a filename or a star command.

This facility is useful for cataloguing tape or disc.



changing drives and so on, though take care as some commands could destroy the program (selecting another language for example).

If a disc error occurs this will be displayed for a short period before you are returned to the menu.

When saving your own screen, it is advisable to set up a window using VDU 28,0,31,4,25.

Although this makes reading a little difficult, anything that you type or the computer outputs will print on the part of the screen where the missing tile starts and not destroy your picture.

You should note that due to



the length of the program several sections are deleted after use before the main program is run.

It is therefore essential that you do not add any extra spaces as you type it in and save the program before running it.

Also the program is

downloaded to &1100 if page is higher. This still allows users of most types of DFS to load their own Mode 2 screens. Unfortunately this does not apply to the ADFS, which cannot be used after a download.

The following function keys are defined and called from

within the program:

- f0** Downloads the program if necessary.
- f1** Deletes all the assembler code.
- f2** Deletes the instructions.

Full listing starts on Page 37

PROCEDURES

play	The main game repeat loop. Repeats indefinitely until Escape is pressed.	grid(gc%)	Draws the grid in the colour gc% that separates the 16 picture titles and sets the initial values for the puzzle.
move	If A% is TRUE this procedure makes the souvenir balloon picture move by redefining the actual colour displayed by colour numbers 1 through 12.	title	Sets the initial program variables and runs the title sequence.
get	Gets keyboard input and returns the new title number (N%).	writeword() f(X%,Y%,C%)	Writes word\$ in big letters at X%,Y%. Fills an area from X%,Y% in the colour C%.
del(D%)	A delay procedure that runs independently of TIME.	inst	Prints the menu of options, gets the one required and returns a string that tallies with the appropriate picture function.
save(h%)	Records each move whether entered from the keyboard or generated by PROCshuffle. Each move is stored as a two bit number thus enabling four moves to be stored per byte.	dim	Dimensions and sets the values of the SIN and COSIN arrays used by PROCs.
solve(D%)	Solves the puzzle by reversing all moves until the picture is restored.	big(A\$,X%,Y%,c%)	Prints A\$ at X%,Y% in colour c% and in double height characters.
shuffle c()	Randomly shuffles the picture tiles. Draws a circle controlled by the numerous parameters.	code	The assembly language procedure for moving the tiles.
		code2	The assembly language for the big letters routine.

If you want to start doing more with your micro than just playing games, this package is your ideal introduction to the four most popular applications for professional computers. All the programs have been designed for simplicity, so even a child can use them. Yet they include advanced features not yet available on programs costing many times as much!

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Graphics: Part of the spreadsheet section, it lets you draw bar charts, pie charts and histograms to give a graphic presentation of your statistics. Helps to give life and colour to the duller figures!

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Royal Wedding listing

From Page 35

```

10REM*****
20REM* ROYAL WEDDING *
30REM* by Gordon Key & *
40REM* David McLachlan *
50REM*(c) Electron User*
60REM*****
65*FX16
70MODE7:PRINTTAB(12,10)*
Please wait.*
80VDU23;8202;0;0;0;
90VDU21:*FX5
100PROCcode:PROCcode2:*FX
21
110*KEY0FORTX=0TODTOP-PAGE
STEP4:TX!&1100=TX!PAGE:NEX
T:MPAGE=&1100!MO.!MRUN!M
120*KEY1DELETE3320,5110
!DELETE10,160!MO.!MRUN!M
130*KEY2DELETE2510,2720
!DELETE170,240!MO.!MRUN!M

140VDU6:PRINTTAB(6,12)*De
leting Assembler Code*:VDU2
1
150*FX130,0,129
160END
170IFPAGE<=&1100 THEN 210

180VDU6:PRINTTAB(12,14)*R
elocating*:VDU21
190*FX130,0,128
200END
210VDU6
220MODE2
230CLEAR
240PROCtitle
250VDU6
260*FX21
270A=GET
280ONERRDRIFERR=17THENCELE
AR ELSE END
290MODE7
300HIMEM=43000
310AZ=EVAL(FNinst):*FX170
,255,0
320IF qcX(>)111 PROCgrid(0
)
330CLEAR
340PROCplay
350END
360DEFPROCplay
370REPEAT
380NX=FNget
390PROCmove
400UNTIL0
410ENDPROC
420DEFPROCmove

```

```

430IFAZ=FALSE ORTIME<E!E
NDPROC
440VDU19,AZ,7;0;:AZ=AXMOD
11+1:VDU19,AZ,4;0;:TIME=0
450ENDPROC
460DEFNget
470LOCAL hX
480NX=0X
490get=0:IF HX>=500 VDU7:
get=GET:IF get(>)13 AND get<
>67 THEN 490
500IF get=67 HX=0 ELSE IF
get=13 PROCsolve(5)
510IFINKEY(-67)AND0XMOD4N
X=0X-1:hX=1:IX=-67
520IFINKEY(-98)AND0XMOD4<
>3NX=0X+1:hX=2:IX=-98
530IFINKEY(-105)AND0X>3NX
=0X-4:hX=3:IX=-105
540IFINKEY(-73)AND0X<12NX
=0X+4:hX=4:IX=-73
550IFINKEY(-74)ANDSZ PROC
solve(5)
560IFINKEY(-99)PROCshuffl
e
570IFhX PROCs(hX-1):REPEA
T:PROCdel(1):UNTILNOTINKEYI
X
580*FX21
590=NX
600DEFPROCdel(dx)
610LOCALTX
620FORTX=0TODX:PROCmove:N
EXIT
630ENDPROC
640DEFPROCc(hX)
650PI=PI+2:IFPI=0:HX=HX+1
:PX=0:HX?DX=0
660hX=hX+2*PX:HX?DX=HX?DX
OR hX:SOUND&10,-15,4,1:SZ=
TRUE
670CALLMX,NX,0X
680ENDPROC
690DEFPROCsolve(dx)
700LOCALhX
710REPEAT
720hX=(HX?DX AND3*2*PX)D1
V2*PX
730NX=0X+(1-(hX>1)*3)*(1+
((hXAND1)=1)*2)
740CALLMX,NX,0X
750PROCdel(dx)
760SOUND&10,-15,5,1
770PI=PI-2:IFPI<0 HX=HX-1
:PX=6
780UNTILHX=-1
790SZ=FALSE
800ENDPROC
810DEFPROCshuffle

```

```

820LOCALfX,qX,hX
830FORTX=0TOD0
840qX=fX
850fX=FALSE:REPEAT
860REPEAT
870PROCmove
880hX=RND(4)
890UNTILhX(>)qX
900IFhX=1AND0XMOD4:NX=0X-
1:fX=2
910IFhX=2AND0XMOD4(>)3:NX=
0X+1:fX=1
920IFhX=3AND0X>3:NX=0X-4:
fX=4
930IFhX=4AND0X<12:NX=0X+4
:fX=3
940UNTILfX
950PROCc(hX-1)
960NEXT
970ENDPROC
980DEFNpic1
990VDU22,2,23;8202;0;0;0;
1000PROCdia
1010PROCgrid(3)
1020RESTORE3190
1030GC0L0,7
1040FORLX=1 TO 105
1050READ XX,YX
1060IF XX=0 AND YX=0 READ
XX,YX:MOVE XX-100,YX
1070DRAW XX-100,YX
1080NEXT
1090FOR LO=0 TO 420 STEP 4
20
1100RESTORE3240
1110READ XX,YX:MOVE XX+LO-
100,YX
1120FOR LOOP=1 TO 6:READ X
X,YX:PLOT 1,XX,YX:NEXT
1130NEXT
1140GC0L0,7
1150RESTORE3190
1160FOR LX=1 TO 69
1170READ XX,YX
1180IF XX=0 AND YX=0 READ
XX,YX:MOVE XX+320,YX
1190DRAW XX+320,YX
1200NEXT
1210PROCc(340,570,50,24,2,
1,3):PROCc(340,570,25,24,2,
1,1):PROCc(552,390,85,12,1,
2,7):PROCc(552,130,75,12,1,
2,7):PROCc(760,570,50,24,2,
1,3):PROCc(760,570,25,24,2,
1,1):PROCc(550,5,1):PROCf(2
70,900,4)
1220PROCf(415,900,4):PROCf
(685,900,4):PROCf(835,900,4
):PROCf(270,850,4):PROCf(69

```

```

0,850,4):PROCf(350,850,4)
1230RESTORE3250
1240FOR QX=1 TO 8:READ Z:B
COL0,Z
1250FOR BX=1 TO 4:READ A,B
,C:PLOT A,B,C
1260NEXT:NEXT
1270FOR X=1 TO 20
1280MOVE1110,200
1290GC0L0,1:XX=RND(200)+1
000:YX=RND(200)+200:DRAW XX
,YX:PROCc(XX,YX,30,12,2,1,2
)
1300NEXT
1310FOR X=1 TO 25:XX=RND(2
00)+1000:YX=RND(200)+200:PR
OCc(XX,YX,30,12,2,1,2):NEXT
1320seagull$=CHR$(230)+CHR
$(231):flap1$=CHR$(234)+CHR
$(232):flap2$=CHR$(235)+CHR
$(233)
1330VDU5:GC0L0,7:MOVE1024
,896:PRINT seagull$
1340GC0L0,8:MOVE1024,896:
PRINTflap1$
1350GC0L0,15:MOVE1024,896
:PRINTflap2$
1360GC0L0,7:MOVE1068,736
:PRINTseagull$
1370GC0L0,15:MOVE1088,73
6:PRINTflap1$
1380GC0L0,8:MOVE1088,736
:PRINTflap2$
1390qcX=111
1400=FALSE
1410DEF PROCf(XX,YX,CX)
1420YX=YX
1430GC0L0,CX
1440REPEAT
1450PLOT77,XX,YX
1460YX=YX+4
1470UNTILPOINT(XX,YX)
1480YX=YX
1490REPEAT
1500PLOT77,XX,YX
1510YX=YX-4
1520UNTILPOINT(XX,YX)
1530ENDPROC
1540DEFNpic3
1550VDU22,2,23;8202;0;0;0;
1560VDU20,1,1,0,0,0,VDU26
,1279;1023:VDU19,3,4,0,0,0
,GC0L0,129:CLB:GC0L0,7
1570qcX=0:RESTORE3270
1580FOR LOOP=1 TO 2
1590FOR LOOP2=1 TO 24
1600READ A,B,C:PLOT A,B,C

```


Royal Wedding listing

From Page 37

```

1610NEXT
1620READ D:BCOL 0,0
1630NEXT
1640=FALSE
1650DEFFNpic2
1660VDU22,2,23;8202;0;0;0;
1670BCOL 0,135:CLG
1680PROCdia
1690PROCgrid(0)
1700PROC(450,700,200,24,1
,1,1)
1710PROC(840,700,200,24,1
,1,1)
1720MOVE 270,620:DRAW 645,
50:PLOT 85,1025,620
1730DRAW 650,660:PLOT 85,2
70,620
1740LX=4900:7LX=3:LX?1=4:L
X?2=16:LX?3=16
1750CALL (LX+6C2)
1760BCOL 0,4
1770PROCwriteword(200,800,
"Andrew")
1780PROCwriteword(565,550,
"&")
1790PROCwriteword(300,300,
"Sarah")
1800gcX=111
1810=FALSE
1820DEF PROCwriteword(X,Y
Z,word$)
1830LX!4=X:LX!6=Y
1840FOR I=1 TO LEN(word$)
1850LX?6C=ASC(MID$(word$,
I,1))
1860CALL (LX+6I5)
1870NEXT
1880ENDPROC
1890DEFFNpic4
1900VDU22,2,23;8202;0;0;0;
1910PROCdia
1920VDU19,15,7;0;
1930COLOUR143:CLS
1940FORTX=1T012
1950BCOL 0,TX
1960VDU19,TX,4;0;
1970IX=TX+2
1980PROC(640+475*c(I),51
2+375*s(I),100,24,1,1,TX)

1990MOVE640+475*c(I),512+
375*s(I):DRAW640,512
2000VDU19,TX,7;0;
2010NEXT
2020VDU19,4,4;0;
2030EX=10:gcX=0
2040=4

```

```

2050DEFFNpic5
2060LOCALFX:FX170,255,0
2070REPEAT
2080FX=FALSE
2090CLS:gcX=0
2100PRINTTAB(0,5)"Please e
nter the required filename"
2110PRINT"or a '*' command
..."
2120INPUT$DX
2130IFLEFT$(40X,1)<>"*"$DX
="LOAD "+$DX+" 3000":VDU22,
2,23;8202;0;0;0;VDU20,0,31
,4,25 ELSEFX=TRUE
2140IX=DXMOD256:YX=DXDIV25
6:CALL&FFF7
2150=FX21
2160IFFX PRINT"Please pr
ess space":REPEATUNTILGET=3
2:UNTILFALSE
2170UNTILTRUE
2180=FALSE
2190DEFFPROC(X,Y,X,Y,FX,
STX,TYX,COLX)
2200BCOL 0,COLX
2210IF STX=2 AND FIX=24 FI
X=23
2220LOCALTX
2230MOVEIX,YX
2240FORTX=0T0FIX STEP STX
X=23
2250MOVEIX,YX
2260IF STX=2 DRAW IX+c(TX)
*RX,YX+s(TX)*RX
2270IF STX=2 PLOT85,IX+c(T
X+1)*RX,YX+s(TX+1)*RX
2280IF STX=1 AND TYX=1 PLO
T85,IX+c(TX)*RX,YX+s(TX)*RX
2290IF TYX=2 MOVE IX+c(TX)
*RX,YX+s(TX)*RX:DRAW IX+c(T
X+1)*RX,YX+s(TX+1)*RX
2300PLOT85,IX+c(TX)*RX,YX+
s(TX)*RX
2310NEXT
2320ENDPROC
2330DEFFPROCgrid(gcX)
2340BCOL 0,gcX
2350FORIX=0T01279STEP320
2360MOVEIX,0
2370DRAWIX,1024
2380NEXT
2390FORYX=0T01023STEP256
2400MOVE0,YX
2410PLOT0,0,4
2420PLOT01,1200,-4
2430PLOT01,0,4
2440NEXT
2450IF gcX<>0 MOVE 1279,0:
DRAW 1279,1023:DRAW 0,1023

```

```

2460BCOL 0,120
2470VDU24,0;0;320;256;:CLG
VDU26
2480HX=-1:PX=6
2490OX=12:SZ=FALSE
2500ENDPROC
2510DEFFPROCtitle
2520AX=0:VDU23;8202;0;0;0;
2530COLOUR135
2540CLS:VDU19,2,4;0;
2550PROCbig("ROYAL",7,0,2)
2560PROCbig("WEDDING",6,13
,1)
2570PROCdel(100)
2580PRINTTAB(2,19)"By Gord
on Key &"
2590PRINTTAB(2,22)"David M
cLachlan"
2600PROCdel(200):PROCgrid(
0):AX=FALSE:PROCshuffle:PRO
Cdel(100):PROCsolve(1):PROC
del(200)
2610CLS
2620PRINTTAB(1,1)"TO MOVE
BLOCKS USE":PRINTTAB(1,3)"T
HE FOLLOWING KEYS"
2630COLOUR 2:PRINTTAB(3,0)
"I.....Left"
2640PRINTTAB(3,11)"X.....
.Right"
2650PRINTTAB(3,14)":.....
.Up"
2660PRINTTAB(3,17)"/.....
.Down"
2670PRINTTAB(3,20)"Space..
.Shuffle"
2680PRINTTAB(3,23)"Return.
.Reset"
2690COLOUR 1:PRINTTAB(2,20)
)"Any key to start"
2700VDU21,19,2,2;0;
2710=FX130,0,130
2720END
2730DEFFNinst
2740VDU22,7:VDU23;8202;0;0
;0;
2750FORTX=2T023:PRINTTAB(0
,TX)CHR$157CHR$132TAB(30)CH
R$156:NEXT
2760VDU20,2,23,37,2
2770CX=65
2780PRINTTAB(5,1)"R O Y A
L W E D D I N G"
2800PRINT:RESTORE 3310
2810REPEAT
2820READA$:UNTILLEN(A$)>5
2830REPEAT
2840PRINTTAB(4);CHR$(CX);C
HR$(VAL(RIGHT$(A$,3)))STRIN

```

```

B$(0,".")LEFT$(A$,LEN(A$)-3
)"
2850READA$
2860CX=CX+1
2870UNTILA$="E"
2880PRINTTAB(4)"Escape ...
To return to menu"
2890PRINT"TAB(3)CHR$129"P
lease select a letter"
2900=FX21
2910REPEAT
2920TX=GET AND &OF
2930UNTILTX>64 ANDTX<70
2935=FX170,0,0
2940="FNpic"+STR$(TX-64)
2950ENDPROC
2960DEFFPROCdia
2970DIMc(24),s(24)
2980TX=0
2990FORT=0T02*PI STEP2*PI/
24
3000c(TX)=COS(T):s(TX)=SIN
(T)
3010TX=TX+1:NEXT
3020ENDPROC
3030DEFFPROCbig(A$,IX,YX,cX
)
3040VDU31,XI,YX
3050COLOURcX
3060LOCALaX,bX,dX,AX
3070FORaX=1T0LENA$
3080?DX=ASC(MID$(A$,aX,1))
3090SOUND1,2,70X,1
3100IX=DXMOD256:YX=DXDIV25
6:AX=&A:CALL&FFF1
3110FORbX=0T01
3120VDU23,bX+130
3130FORcX=0T03:FORDZ=0T01
3140VDUDZ?(cX+bX+4+1)
3150NEXT:NEXT:NEXT
3160VDU130,10,0,131,11
3170NEXT
3180ENDPROC
3190DATA 0,0,330,855,340,0
55,365,900,390,855,490,855,
515,900,540,855,550,855,550
,820,540,820,540,770,490,77
0,440,885,390,770,340,770,3
40,820,540,820,330,820,330,
855,550,855,0,0,340,770,340
,630,390,630,390,770
3200DATA 0,0,390,630,490,6
30,490,770,0,0,490,630,540,
630,540,770,540,0,340,0,340
,630,340,600,400,600,0,0,40
0,600,540,600,0,0,340,500,5
40,500,0,0,340,475,540,475,
0,0,340,325,390,325,390,425
,440,455,490,425,490,325,54

```




To mark the happy occasion we've included this superb digitised picture of the Royal couple in our monthly tape. There's also a conversion program to allow it to be used in the sliding block puzzle. Turn to Page 50.

```
0,325,390,325
3210DATA 0,0,340,225,405,2
25,0,0,475,225,540,225,540,
210,490,210,440,250,390,210
,340,210,390,210,390,120,34
0,120,390,120,390,0,490,0,4
90,120,540,120,490,120,490,
210,0,0,540,520,760,520,752
,520,650,630,552,520
3220DATA 0,0,650,600,632,5
00,632,540,672,540,672,500,
650,600,0,0,540,505,760,505
,0,0,540,400,760,490,0,0,54
0,230,565,230,565,390,565,2
30,737,230,737,390,737,230,
760,230,760,215,540,215,0,0
,540,340,565,340
3230DATA 0,0,745,340,760,3
40,760,130,725,130,725,0,57
5,0,575,130,540,130,540,0,7
60,0
3240DATA 440,855,0,125,0,-
10,10,0,0,-70,-10,0,10,0
3250DATA 0,4,345,900,1,40,1
0,1,0,65,1,-40,-15,0,4,770,
900,1,40,10,1,0,70,1,-40,-1
0,15,4,770,900,1,50,40,1,0,
70,1,-50,-40,15,4,350,900,1
,45,40,1,0,70,1,-45,-40,7,4
,390,934,5,390,930,4,810,93
4,5,810,930,1,4,1005,0,1,0,
40,4,1093,0,1,0,100
3260DATA 1,4,1130,0,1,0,70,
4,1100,0,1,0,250,1,1,25,0,1
,0,-250,1,-6,0,1,0,250
3270DATA 4,0,00,5,440,430,0
5,0,430,4,0,590,5,440,590,0
```

```
5,0,940,4,00,1023,5,560,640
,85,560,1023,4,720,1023,5,7
20,640,85,1200,1023,4,1279,
940,5,840,590,85,1279,590,4
,1279,430,5,840,430,85,1279
,80,4,1200,0,5,720,300,85,7
20,0,4,560,0,5,560,300
3280DATA 05,00,0,3,4,0,660,
5,290,660,85,0,900,4,100,10
23,5,520,750,85,520,1023,4,
790,1023,5,790,740,85,1140,
1023,4,1279,860,5,1000,640,
85,1279,640,4,1279,360,5,90
0,360,85,1279,120,4,1100,0,
5,760,260
3290DATA 05,760,0,4,490,0,5
,490,270,85,140,0,4,0,160,5
,200,300,85,0,300,0
3300DATA 06,134,16
3310DATA Westminster Abbey
132,Royal couple132,Union J
ack132,Souvenir balloon132,
Load own picture132,E,1,4,6
,9
3320DEFPROCcode
3330scrnpoint=400
3340varpoint=470
3350FORIX=0TO2STEP2
3360PX=4110
3370MX=PX
3380(OPTTX
3390ISEI
3390LDA4601:STAvarpoint
3400LDA4602:STAvarpoint+1
3410LDA4604:STAvarpoint+2
3420LDA4605:STAvarpoint+3
3430LDY00
```

```
3440LDA(varpoint+2),Y:AND#
15
3450TAX
3460LDApointer1,X:STAscrnp
oint+2
3470LDApointerh,X:STAscrnp
oint+3
3480LDA(varpoint),Y:AND#15
3490STA(varpoint+2),Y
3500TAX
3510LDApointer1,X:STAscrnp
oint
3520LDApointerh,X:STAscrnp
oint+1
3530LDX00
3540.loop1
3550LDY0160
3560.loop2
3570LDA(scrnpoint),Y
3580STA(scrnpoint+2),Y
3590LDA#0
3600STA(scrnpoint),Y
3610DEY:BNEloop2
3620DEX:BEQout
3630CLC:LDAscrnpoint
3640ADC#400:STAscrnpoint
3650LDAscrnpoint+1
3660ADC#2:STAscrnpoint+1
3670CLC:LDAscrnpoint+2
3680ADC#400:STAscrnpoint+2
3690LDAscrnpoint+3
3700ADC#2:STAscrnpoint+3
3710SEC:BCSloop1
3720.out CLJ
3730RTS
3740.pointer1
3750:PX=PX+16:(OPTTX
```

```
3760.pointerh
3770: NEXT
3780DX=4A00
3790FORIX=0TO3
3800FORIX=0TO3
3810AZ=43000+IX*160+YI*614
00-1
3820pointer1?(IX+YI*4)=AXH
00256
3830pointerh?(IX+YI*4)=AID
IV256
3840NEXT
3850NEXT
3860ENVELOPE1,0,0,0,0,0,0,
0,126,-4,-3,-3,126,100
3870ENVELOPE2,1,0,0,0,0,0,
0,63,43,0,-63,63,126
3880VDU6,23,230,0,0,112,29
,7,1,1,0
3890VDU23,231,0,0,14,104,2
24,120,120,0
3900VDU23,232,1,3,0,0,0,0,
0,0
3910VDU23,233,0,0,0,3,0,0,
0,0
3920VDU23,234,120,192,0,0,
0,0,0,0
3930VDU23,235,0,0,0,192,0,
0,0,0,21
3940ENDPROC
3950DEFPROCcode2
3960 OSWORD=&FFFFI
3970 OSWRCH=&FFEE
3980 FOR passX=0 TO 2 STEP 2
3990PX=4900
4000 I
4010 OPT passX
4020 .width NOP
4030 .depth NOP
4040 .xstep NOP
4050 .ystep NOP
4060 .xpos NOP:NOP
4070 .ypos NOP:NOP
4080 .xstore NOP:NOP
4090 .ystore NOP:NOP
4100 .pattern NOP
4110 I
4120 $PX="12345678"
4130 PX=PX*8
4140 I OPT passX
4150 .start LDY # pattern
MOD 256
4160 LDY # pattern DIV 256
4170 LDA # 40A
4180 JSR OSWORD
4190 LDA ypos
4200 STA ystore
```


Royal Wedding listing

From Page 39

4210 LDA ypos+1	4430 STA xstore	4680 RTS	4930 LDX width
4220 STA ystore+1	4440 LDA xstore+1	4690 .write LDA # 5	4940 .define_row SEC
4230 LDY # 0	4450 ADC # 0	4700 JSR OSWRCH	4950 ROR A
4240 .outer_loop LDA xpos	4460 STA xstore+1	4710 LDA # 19	4960 DEI
4250 STA xstore	4470 PLA	4720 JSR OSWRCH	4970 BNE define_row
4260 LDA xpos+1	4480 INX	4730 LDA # 4	4980 LDY depth
4270 STA xstore+1	4490 CPX # 0	4740 JSR OSWRCH	4990 .send_rows JSR OSWRCH
4280 LDA pattern+1,Y	4500 BNE inner_loop	4750 LDA xstore	5000 DEY
4290 LDX # 0	4510 SEC	4760 JSR OSWRCH	5010 BNE send_rows
4300 .inner_loop ASL A	4520 LDA ystore	4770 LDA xstore+1	5020 .send_blanks
4310 BCC noprint	4530 SBC ystep	4780 JSR OSWRCH	5030 LDY # 0
4320 PHA	4540 STA ystore	4790 LDA ystore	5040 LDA # 0
4330 TXA:PHA	4550 LDA ystore+1	4800 JSR OSWRCH	5050 .blank JSR OSWRCH
4340 TYA:PHA	4560 SBC # 0	4810 LDA ystore+1	5060 DEY
4350 JSR write	4570 STA ystore+1	4820 JSR OSWRCH	5070 BNE blank
4360 PLA:TYA	4580 INY	4830 LDA # 160	5080 RTS
4370 PLA:TXA	4590 CPY # 0	4840 JSR OSWRCH	5090 J
4380 PLA	4600 BNE outer_loop	4850 LDA # 4	5100 NEXT passX
4390 .noprint PHA	4610 CLC	4860 JSR OSWRCH	5110ENDPRDC
4400 CLC	4620 LDA xstore	4870 RTS	
4410 LDA xstore	4630 ADC xstep	4880 .definer LDA # 23	
4420 ADC xstep	4640 STA xpos	4890 JSR OSWRCH	
	4650 LDA xstore+1	4900 LDA # 160	
	4660 ADC # 0	4910 JSR OSWRCH	
	4670 STA xpos+1	4920 LDA # 0	

This listing is included in this month's cassette tape offer. See order form on Page 53.

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OSWORD

In the final part of this series
JOHN WOOLLARD explains the
 five remaining Osword calls

THIS is our last venture into the world of Osword in this series. There are five calls left to be explained and first we'll take a look at those concerned with the internal elapsed time clock – Oswords 1 and 2 – and the interval timer – Osword 3 and 4.

The internal clock counts the time in hundredths of a second and it starts the very moment your micro is switched on. To discover its value simply enter:

PRINT TIME

The result, TIME, is a number between zero and several billion. We can use that value to set and then read the real time. To convert the numbers to hours, minutes and seconds requires these operations:

```
seconds = (TIME DIV 100)
          MOD 60
minutes = (TIME DIV 6000)
          MOD 60
hours = (TIME DIV 360000)
        MOD 24
```

Remember also that the clock ticks 100 times per second, so 100 is 1 second, 2 x 100 is 2 seconds ... 60 x 100 is 60 seconds or one minute and so on. Conversely to set the TIME – ignoring seconds – simply enter:

```
TIME=hours*360000+minutes*6000
```

The interval timer is another clock similar to the internal clock and again it increments every hundredth of a second.

However it is different in that its value cannot be found using Basic instructions. We'll see shortly how Osword calls 3 and 4 are used to read and write its value.

Program I illustrates the basic principle of making Osword calls. They all require a parameter block so that data may be passed to or received from the routine summoned.

That block can be placed anywhere in the memory of the computer. Its address is placed in the X and Y registers

before the call is made, X taking the lo-byte and Y the hi-byte.

Figure I shows the structure of the parameter block that passes the value of the internal clock TIME in Program I. It's located immediately after the code and is labelled *time*.

X is made equal to *time* MOD 256 – the lo-byte – and Y equal to *time* DIV 256 – the hi-byte. Running the program sets TIME to zero – it prints the value before and after the machine code call is made.

Let's see how the internal clock can be used. The maximum value that is of interest to most users is 24 hours which is 24*60*60*100 or 8640000. This can be stored in three bytes.

However Oswords read and write TIME as five bytes, so the top two bytes of the parameter block are unnecessary and are set to zero. The

other three take on a value which is equivalent to 360000 x hours + 6000 x minutes + 100 x seconds.

Program I can easily be modified to set the internal clock to the current time. Here's an example that sets TIME to half past one in the afternoon (13:30:00) – 360000 x 13 + 6000 x 30, or 4680000. In hex that's &476940. Change lines 120 to 160 of Program I to:

```
160 EQU 440
170 EQU 469
180 EQU 447
190 EQU 40
200 EQU 40
```

and run it again.

It should be noted that the parameter block contains the least significant number first – the highest two values in the

Block	Value
YX	Least significant byte of TIME.
YX+1	—
YX+2	—
YX+3	—
YX+4	Most significant byte of TIME.

Figure I: Parameter blocks for Osword calls 1 to 4

```
10 REM PROGRAM I
20 osword = &FFF1
30 program = &900
40 FOR opt=0 TO 2 STEP 2
50 PX = program
60 [OPT opt
70 LDX# time MOD 256
80 LDY# time DIV 256
90 LDA# 2 : JSR osword
100 RTS
110 .time
```

Program I

Block	Value
YX	Low byte of buffer address.
YX+1	High byte of buffer address.
YX+2	Maximum length of input line.
YX+3	Minimum acceptable Ascii value.
YX+4	Maximum acceptable Ascii value.

On exit C=0 if Return is pressed. C=1 if Escape is pressed.
 Y=length of input string.
 Control+U is used to delete the whole input – the Delete key only removes the last character entered.

Figure II: Parameter block for Osword call A=0

```
10 REM PROGRAM II
20 osword = &FFF1
30 program = &900
40 FOR opt=0 TO 2 STEP 2
50 PX = program
60 [OPT opt
70 LDX# time MOD 256
80 LDY# time DIV 256
90 LDA# 1 : JSR osword
100 RTS
110 .time
```

Program II

From Page 41

block being set to zero.

Program II uses Osword 1 to read the clock. The result is placed in the parameter block *time*. Line 200 prints the value of TIME and line 210 prints the contents of the block.

The reason they are sometimes different is that TIME may be incremented in the period between the computer processing line 190 then 200.

The internal clock is useful in programs if the real time needs to be displayed. By setting it at the start of the program the time can be printed out by converting the

value of TIME to seconds, minutes and hours.

We'll now consider that other clock, the interval timer. In many ways this is a much more powerful tool than TIME, but unfortunately its value cannot be read or written directly from Basic.

Program III shows how the timer is read using Osword with A=3. Like the programs for reading and writing the value of TIME the parameter block contains five bytes of data.

The usefulness of the interval timer is that it can generate interrupts. If you're not sure what interrupts are then have

a look at the last in the Osbyte series in the February 1986 issue of *Electron User*.

Briefly, your micro has been designed so that certain events or happenings are immediately and automatically communicated to the central processor. The computer can be made to act in a specific way on receiving a particular signal.

One of those events occurs when the interval timer crosses zero. It's like a 24 hour clock at 0:00:00 midnight going right

round and back to 0:00:00 at midnight the next day.

There are four steps we have to take to make this a useful technique.

- Set up a machine code routine that you wish to occur at a predetermined time when the event occurs.

- Place the address of the start of the machine code routine in locations &220 and &221, i.e. then hi byte.

- Activate the interrupt using the Osbyte call A=14, X=5 and Y=0 or use *FX14,5 in

```

10 REM PROGRAM III
20 osword = &FFF1
30 program = &900
40 FOR opt=0 TO 2 STEP 2
50 PI = program
60 [OPT opt
70 LDX# time MOD 256
80 LDY# time DIV 256
90 LDA# 3 : JSR osword
100 RTS
110 .time
120 EQU 0
130 EQU 0
140 EQU 0
150 EQU 0
160 EQU 0
170 ]
180 NEXT
190 CLS:VDU23,1,0;0;0;0;
200 CALL program
210 PRINT TAB(5,10)"Interval Timer=";time
220 GOTO200

```

Program III

```

10 REM PROGRAM IV
20 osword = &FFF1
30 program = &900
40 FOR opt=0 TO 2 STEP 2
50 PI = program
60 [OPT opt
70 .interrupt
80 PHA:TXA:PHA:TYA:PHA
90 LDX# sound MOD 256
100 LDY# sound DIV 256
110 LDA# 7 : JSR osword
120 PLA:TAY:PLA:TAX:PLA
130 RTS
140 .sound
150 EQU 1
160 EQU -15
170 EQU 100
180 EQU 30
190 .setup
200 LDX# time MOD 256
210 LDY# time DIV 256
220 LDA# 4 : JSR osword
230 RTS
240 .time
250 EQU &40
260 EQU &F4
270 EQU &FF
280 EQU &FF
290 EQU &FF
300 ]
310 NEXT
320 REM set up interrupt pointer
330 ?&220 = interrupt MOD 256
340 ?&221 = interrupt DIV 256
350 REM set interval time r to -30 seconds
360 CALL setup
370 REM enable interval timer interrupt event
380 *FX 14,5

```

Program IV

```

10 REM PROGRAM V
20 osword = &FFF1
30 osbyte = &FFF4
40 program = &900
50 FOR opt=0 TO 2 STEP 2
60 PI = program
70 [OPT opt
80 LDA#interrupt MOD 256
: STA &220
90 LDA#interrupt DIV 256
: STA &221
100 LDA# 14 : LDX# 5 : LDY# 0 : JSR osbyte \*FX14,5
110 .interrupt
120 PHA:TXA:PHA:TYA:PHA
130 LDX# sound MOD 256
140 LDY# sound DIV 256
150 LDA# 7 : JSR osword
160 \SOUND 1,-15,255,1
170 LDX# time MOD 256
180 LDY# time DIV 256
190 LDA# 4 : JSR osword
200 \ forces the interval timer to -1 second
210 PLA:TAY:PLA:TAX:PLA
220 RTS
230 .sound
240 EQU 1
250 EQU -15
260 EQU 100
270 EQU 1
280 .time
290 EQU &9C
300 EQU &FF
310 EQU &FF
320 EQU &FF
330 EQU &FF
340 ]
350 NEXT
360 CALL program

```

Program V

```

10 REM PROGRAM VI
20 osbyte = &FFF4
30 osword = &FFF1
40 oswrch = &FFEE
50 DIM program &140
60 FOR opt=0 TO 2 STEP 2
70 PI = program
80 [OPT opt
90 .inputbuffer
100 EQU$ STRING$(255,CHR$(13))
110 .block
120 EQU inputbuffer MOD 256
130 EQU inputbuffer DIV 256
140 EQU 255
150 EQU 0
160 EQU 255
170 .input
180 LDX# block MOD 256
190 LDY# block DIV 256
200 LDA# 0 : JSR osword
210 BCS escape
220 RTS
230 .escape
240 LDA# 126 : LDX# 0 : LDY# 0
250 JSR osbyte
260 RTS
270 ]
280 NEXT
290 CALL input
300 PRINT $inputbuffer
310 PRINT $&600

```

Program VI

Basic. To disable the interrupt we use *FX13,5.

● Set the interval timer so that it reaches zero in the required number of seconds, minutes or hours.

Program IV illustrates these steps – it produces a sound after 30 seconds. The part of the program that is called when the interrupt occurs starts on line 70. It uses another Oword call with A=7 to generate a sound, and its parameter block contains the eight bytes of data required.

The address of the interrupt routine is placed in locations &220 and &221 and the interrupt is activated using *FX14,5. A short machine code routine is used to set the interval timer to minus 30 seconds, which is a bit like setting a 24 hour clock to 30 seconds to midnight, 11:59:30.

This means that the beep will occur exactly 30 seconds after the program has been run when the timer crosses zero, no matter what the computer is doing – this is the power and value of interrupts.

Program V uses the same interrupt technique to make the computer tick every second. To stop the ticking disable the interrupt using *FX13,5. To calculate the value to set the interval timer:

```
PRINT'&FF';~-(hours*360000+
minutes*6000+seconds*100)
```

```
10 REM PROGRAM VII
20 osbyte = &FFF4
30 osword = &FFF1
40 oswrch = &FFEE
50 DIM program &140
60 FOR opt=0 TO 2 STEP 2
70 PI = program
80 [OPT opt
90 .inputbuffer
100 EQU$ STRING$(255,CHR$
13)
110 .block
120 EQU$ inputbuffer MOD
256
130 EQU$ inputbuffer DIV
256
140 EQU$ 5
150 EQU$ 97
160 EQU$ 122
170 .input
180 LDX# block MOD 256
190 LDY# block DIV 256
200 LDA# 0 : JSR osword
210 BCS escape
220 RTS
230 .escape
240 LDA# 126 : LDX# 0 : L
DY# 0
250 JSR osbyte
260 RTS
270 ]
280 NEXT
290 CALL input
300 PRINT $inputbuffer
```

Program VII

‘... this is the power and value of interrupts’

and place the bytes in reverse order in the parameter block.

The final Oword call with A=0 is used by machine code programmers to input a string from the keyboard. It's the equivalent of Basic's INPUT. Figure II shows the structure of the parameter block.

The parameter block determines the maximum length of the string, the range of characters that are acceptable and the address where the operating system is to store it.

Program VI contains an input routine that can be used in any machine code program. Line 100 reserves 255 bytes of memory for the string and lines 120 to 160 set up the Oword parameter block. Figure II outlines its structure.

After the Oword call has been made the routine checks to see if the Carry flag is set in line 210. This is the operating system's way of telling us that Escape was pressed. If it is set then Escape must be acknowledged with Osbyte 126.

In Program VI the string is stored in *inputbuffer* situated at the start of the machine code program. However the

computer has its own buffer for inputting strings. It's located in page 6 of the memory, from &600 to &6FF.

Lines 300 and 310 of the program print out the contents of that buffer as well as the buffer specified by our program. You can see that they're the same.

You'll actually see three strings – the one you type in, the one the operating system stores at &600 and the one stored by Program VI.

Program VII shows how the inputted characters can be restricted by changing the values in the parameter block.

Only lower case letters are entered into our buffer, but notice that all characters typed are printed on the screen. Try it and you'll see what I mean.

In the parameter block

location XY+3 is set to 97 (Ascii a) and XY+4 is 122 (Ascii z). In addition only five characters can be entered – XY+2 equals 5.

Program VIII shows another use of the input routine. It inputs a string and displays it backwards.

The routine uses the fact that after the input call has been made the Y register contains the value of the length of the string.

After the string has been input a loop is used to print out the string in reverse. Osrch is used to send the character to the screen.

● *That's the end of this series on Oword calls. I hope you find them useful in your endeavours. Good luck with your programming.*

```
10 REM Program VIII
20 osbyte = &FFF4
30 osword = &FFF1
40 oswrch = &FFEE
50 DIM program &140
60 FOR opt=0 TO 2 STEP 2
70 PI = program
80 [OPT opt
90 .inputbuffer
100 EQU$ STRING$(255,CHR$
13)
110 .block
120 EQU$ inputbuffer MOD
256
130 EQU$ inputbuffer DIV
256
140 EQU$ 255
150 EQU$ 32
160 EQU$ 127
170 .input
180 LDX# block MOD 256
190 LDY# block DIV 256
200 LDA# 0 : JSR osword
210 BCS escape
220 RTS
230 .escape
240 LDA# 126 : LDX# 0 : L
DY# 0
250 JSR osbyte
260 RTS
270 \input string
280 \and reverse it
290 .reverse
300 JSR input
310 .loop
320 LDA inputbuffer,Y
330 JSR oswrch
340 CPY# 0 : BEQ rts
350 DEY
360 JMP loop
370 .rts
380 LDA# 10 : JSR oswrch
390 LDA# 13 : JSR oswrch
400 RTS
410 ]
420 NEXT
430 CALL reverse
```

Program VIII

THIS month we'll be leaving behind the functions we got entangled with last time and moving on to a whole new way of programming.

But first let's look at an old, horrible way of programming, in the form of Program 1.

```
10 REM Program 1
20 PRINT "Enter monthly
income"
30 INPUT monthly
40 IF monthly<200 THEN G
OTO 100 ELSE GOTO 200
100 REM below tax thresho
ld
110 PRINT "Net pay is 'ja
onthly' tax paid is 0"
120 GOTO 300
200 REM tax routine
210 tax=monthly*.1
220 net=monthly-tax
230 PRINT "Net pay is 'jn
et' tax paid is 'tax
240 GOTO 300
300 END
```

Program 1

By now you should be well aware of my prejudice against GOTOs. They should be avoided at all costs.

Still, in Program 1 they're not too bad: It's fairly easy to see what's happening. Which, to be honest, is very little!

All the program does is to ask you how much you earn per month and store it in the variable *monthly*. Line 40 then tests *monthly* to see if it is less than 200 (in which case no tax has to be paid).

If this is so, the program jumps to line 100. Otherwise it goes to line 200.

Suppose that *monthly* had the value 100. In this case it's true that *monthly* is less than 200, so the program immediately moves to line 100.

This is just a REM hinting at what the next few lines are going to do. In fact, they don't do much. Line 110 just tells you your net pay and the fact that you pay no tax.

The next line is more interesting. Its GOTO has the program going to line 300 which is the END that ends the program.

Now if *monthly* was 200 or

over, say 300, then the test of line 40 would fail and the part after the ELSE would be performed.

This sends the program to line 200 which is the start of a section of code that works out the tax paid and the net pay.

There's nothing difficult in either the coding or the maths, although the tax rate is sadly far from realistic.

At the end of that line 240 tells the program to GOTO line 300, the end again.

This last GOTO isn't really necessary, as the program would have come to line 300 anyway. However it's good practice to put it in, to keep things tidy and allow easier modification of the program at a later date.

It helps to have all the loose ends of a program gathered up at a single END.

Notice the way that the IF of line 40 chooses between two sections of code.

Also see how the two bits of code are completely separate. I've highlighted this by using line numbers starting at 100 and 200 for each section.

When the program is run, only one of these bits of code is performed, the GOTOs being used to leap over the unused lines. Figure 1 shows the program's flow of control diagrammatically.

This idea of having separate sections of a program doing separate things is extremely important, as you'll find when you come to write more complicated, practical pro-

grams of your own.

As we'll see, they make it much easier to write, correct and alter programs. And to be fairly confident that they will work.

The trouble is the GOTOs

are messy and in a long program they get messier.

What we need are sub-routines. Program 11 has an example of one of these in use.

Looking at lines 10 to 60 the program seems fairly

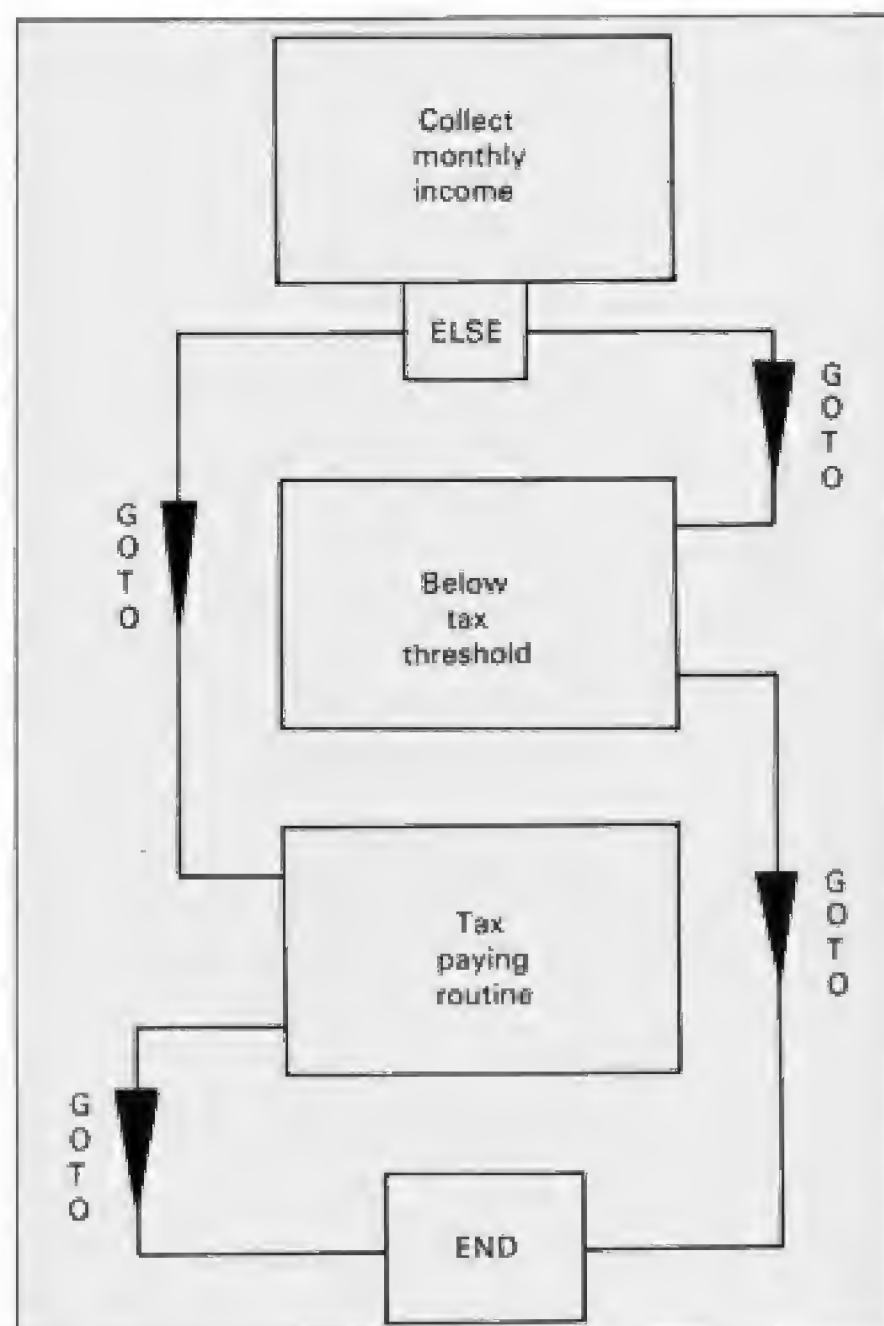


Figure 1: Flow of control for Program 1


```

10 REM Program II
20 PRINT "Give me a number"
30 INPUT number
40 GOSUB 100
50 PRINT "The square of
  "number" is "square
60 END
100 REM squaring routine
110 square=number*number
120 RETURN
  
```

Program II

straightforward. It takes a number from the keyboard and stores it in *number*.

Line 50 obviously prints out the value of *number* squared, and line 60 brings things to a halt. But what is this GOSUB 100 in line 40?

GOSUB tells the micro that it is to go to a section of code beginning at the line specified (in this case 100) and perform that. This code is known as a subroutine.

In this case the Electron obeys line 40 and goes to the subroutine starting at line 100. This is just a REM labelling the subroutine.

Take my advice, and always use a REM or two to explain what the subroutine does – or what you hope it does! It saves a lot of time, trouble and torment when you come to correcting or debugging faulty programs.

Once the program has entered the subroutine at line 100 it carries on as normal, going from line to line.

In this case it ignores the REM and goes on to calculate the square of *number*, storing it in *square*.

The next line contains another new keyword, RETURN. This does two things. First of all it marks the end of the subroutine (notice that there's nothing to show the start of a subroutine, hence the use of a REM).

It does more than that however: It also tells the micro to go back to the line that follows the one that called the subroutine, that is, the line after the original GOSUB.

In this case it was line 40 that sent the program hurtling off to the subroutine starting at line 100, so the RETURN of

line 120 sends the program back to line 50.

The micro then carries on as normal, going from line to line.

Line 50 just displays the value of *square* and the next line, 60, ends the program.

If you like, you can look on the subroutine as a little program in its own right.

In Program II we only had one simple assignment statement before the micro came across the RETURN that ended the subroutine.

In fact you can have all the normal Basic commands in a subroutine. So you can have loops, IF statements and even subroutines.

More of this later on. The point to grasp is that GOSUB allows us to use a section of code without all the messiness we'd meet if we tried doing it with GOTOs.

A closer look at Program II produces a bit of a puzzle. After all, the END of line 60 brings things to a halt. So how does the program get to use lines 100 to 120 which come after the END?

The answer lies in the fact that the GOSUB that accesses the routine comes before the END. As this sends the program off to the code beginning at line 100, the END is jumped over.

It's rather like the way the GOTOs leapt over code in Program I. At the end of the subroutine, the program goes back to line 50 and then meets the END of line 60.

And this END has to be there. Try leaving it out and see what happens.

You get:

No GOSUB at line 120

What has happened is that the program has performed as before, calling the subroutine and then RETURNing to the line after it and carrying on from there.

Only now the END is missing. The program carries on undaunted and gets on with executing lines 100 and 110. So far so good.

But what does the poor Electron do with the RETURN of line 120?

Normally when it meets a GOSUB the micro keeps a

```

10 REM Program III
20 PRINT "Enter monthly
  income"
30 INPUT monthly
40 IF monthly<200 THEN B
  OSUB 100 ELSE GOSUB 200
50 END
100 REM below tax thresho
  ld
110 PRINT "Net pay is "jn
  onthly" tax paid is 0"
120 RETURN
200 REM tax routine
210 tax=monthly*0.1
220 net=monthly-tax
230 PRINT "Net pay is "jn
  et" tax paid is "tax
240 RETURN
  
```

Program III

note of the following line number so it knows where to go back to when it meets RETURN. The GOSUBs and RETURNS are neatly paired.

Except, that is, at line 120 where the program now comes across a RETURN without having a matching GOSUB, and hence no place to return to.

The result is the computer gives up and an error message is issued.

So the rule is tuck your subroutines away after an END. You can look on these subroutines at the end of the program as similar to the appendices of a book. When the program comes across a GOSUB it refers to these subroutines to find out what to

do. After this brief diversion it carries on with the main program. Figure II shows the flow of control in Program II.

Program III is a version of Program I. This time it uses the much superior subroutines rather than the horrible GOTOs.

The first three lines do the same job as before, but line 40 has changed. It now chooses between two subroutines, rather than two sections of code insulated from each other by a series of GOTO-inspired jumps.

The code in these two subroutines is just the same as before, except that now they are tucked away after the END

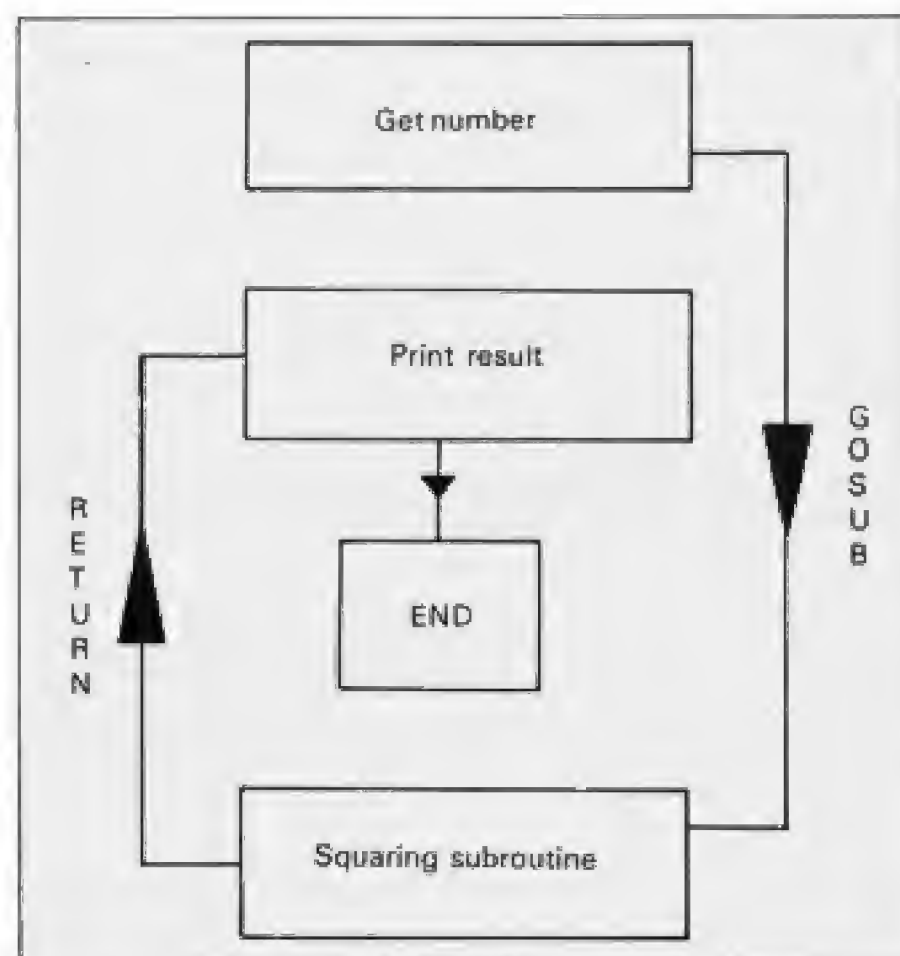


Figure II: Flow of control for Program II

Beginners

From Page 45

of line 50 and they are both terminated with RETURN.

In this case it makes little or no difference whether we use subroutines or not. The code is practically the same, although I think you'll agree that once you know about subroutines, Program III is easier to follow.

So subroutines make programs simpler. They can also save a lot of typing.

Very often programs use the same bits of code over and over again with only minor differences. A games program might calculate the score after every screen, the only difference in the sums being the actual bonus per screen held in, say, the numeric variable *bonus*.

It's much easier to have just one scoring subroutine and call it with the appropriate value of *bonus*, rather than copy out all the lines of the scoring routine each time you want to use it.

And subroutines not only simplify programs and save typing time, they also make it much easier to alter them.

Suppose that the tax laws suddenly changed, and instead of being taxed at 10 per cent it becomes 20 per cent.

In Program I we have to search through the listing, find the appropriate line and change it. In Program III we can go straight to the "tax routine" subroutine and modify that in the light of the new rate.

In fact, we could change all the code in that subroutine, adding new lines and the program would still work. We could "plug in" an entirely new routine as needed without having to worry about the rest of the program.

In the longer, more practical programs that you'll soon be writing, this ability to modify programs by changing the subroutines makes life a lot easier. But before you start creating an epic listing have a look at Program IV.

It consists of just two subroutines. The first, lines 100 to 130, simply asks for the user's age and stores it in

```
10 REM Program IV
20 GOSUB 100:REM get the
age
30 GOSUB 200:REM give th
e message
40 END
100 REM collects age
110 PRINT "How old are yo
u"
120 INPUT age
130 RETURN
200 REM displays message
210 IF age<0 THEN PRINT "
```

Program IV

age. The second, lines 200 to 260, prints out an appropriate message if the right age is entered.

Notice how the subroutines begin with an explanatory REM and each start on a line number which is a multiple of 100, making them easy to find.

The program itself is desperately simple, but it does show a couple of things. Look how short the main program is. It's only four lines long and one of those is a REM and another the END!

Really, only two lines are doing the work, the two that call the subroutines. Yet in those two lines the whole structure of the program is shown clearly. Of course, the REMs help. (Moral: if in doubt,

```
10 REM Program V
20 GOSUB 100
30 GOSUB 200
40 END
100 REM collects age
110 PRINT "How old are yo
u"
120 INPUT age
130 RETURN
200 REM displays message
210 IF age<0 THEN GOSUB 3
00
220 IF age>0 AND age<5 TH
EN GOSUB 400
230 IF age<18 THEN GOSUB
500
240 IF age=21 THEN GOSUB
```

Program V

```
Liar"
220 IF age>0 AND age<5 TH
EN PRINT "You learnt to rea
d early"
230 IF age<18 THEN PRINT
"You can't vote"
240 IF age=21 THEN PRINT
"Ever been kissed?"
250 IF age=40 THEN PRINT
"Your life is beginning aga
in"
260 RETURN
```

stick a REM there.)

I said earlier that subroutines could be looked on as mini-programs. They can have IF statements and loops and all the normal structures. They can even call subroutines as Program V, which does the same job as Program IV, demonstrates.

The big change comes in the subroutine formed by lines 200 to 260. Here, instead of a simple PRINT after the IF, another subroutine is called.

These new subroutines are listed from lines 300 to 710. I haven't put in the normal opening REMs as I think the PRINT statements document them fully.

Of course it's a trivial example but suppose that these sub-subroutines were

```
250 IF age=40 THEN PRINT
"Your life is beginning aga
in"
260 RETURN
300 PRINT "Liar"
310 RETURN
400 PRINT "You learnt to
read early"
410 RETURN
500 PRINT "You can't vote
"
510 RETURN
600 PRINT "Ever been kiss
ed?"
610 RETURN
700 PRINT "Your life is b
eginning again"
710 RETURN
```

more useful than just a silly message.

They might, in fact, be routines to work out age-related benefits. So if you are between 0 and 5 years of age, the subroutine at 400 might contain all sorts of child welfare information and calculations. It might even call other subroutines.

But more of that next month. For the moment just grasp that like big fleas have little fleas, so subroutines can call subroutines.

But before you get the itch to write a few subroutines yourself have a look at Program VI.

```
10 REM Program VI
20 firstRoutine=100
30 secondRoutine=200
40 GOSUB firstRoutine
50 GOSUB secondRoutine
60 END
100 REM first routine
110 PRINT "first routine"
120 RETURN
200 REM second routine
210 PRINT "second routine"
220 RETURN
```

Program VI

While it hardly pushes back the frontiers of Electron programming, it does show one important technique.

Notice how the GOSUBs of lines 40 and 50 are followed by variable names instead of the usual numbers.

The line numbers have been stored in *firstRoutine* and *secondRoutine* in lines 20 and 30. This makes the program much clearer to read and understand. Programs with lines like:

```
100 GOSUB calculateTax
```

or:

```
200 GOSUB zapAlien
```

are almost self-documenting.

Unfortunately though, the RENUMBER command doesn't take them into account so they aren't too practical.

● On which note we'll finish for this month. Next time we'll have a look at subroutines in greater detail and see how they can help us plan our programs.

Micro Messages

Viewstore for those really big databases

I HAVE a Cumana disc system and wanted to use the spare ROM socket for a good disc-based database.

After much difficulty in getting answers as far as compatibility is concerned I decided to risk buying Viewstore in the hope that it would work.

It did so perfectly. It is rather slow, as is a lot of BBC software run on the Electron, but it allows Electron users to handle extremely large databases.

It passes information to View (ROM cartridge) for mail merging perfectly. Among other things I now use Viewstore for cataloguing my collections of books, cassettes and records.

As you know the Electron does not have the same function keys as the BBC Micro. After trial and error I discovered that the Electron's commands were as below:

Key	Function
1	Record Format
2	Change Display
3	Delete End of Record
4	Beginning of Field
5	End of Field
6	Index Field
7	Locate
8	Insert Character
9	Delete Character
0	Data
A	Card Layout
B	Database Header
C	Cursor Lock
J	Delete Record
M	Beginning of Record
N	End of Record
O	Down one Screen
P	Up one Screen
.	End of File
/	Beginning of File
-	Forward one Character
,	Back one Character

Because the Cumana disc system should not get 'Can't Extend' errors it is not necessary to state the space required on the disc when setting up a database.

I see no reason why Viewstore should not work for Plus 3 users as well, providing they have something like a ROM adapter for a Plus 1

Cartridge or a Slogger ROM Box.

Finally could you tell me if the Slogger Turbo-driver might speed up Viewstore by making disc accessing faster?

Would this make my Electron any more unreliable? It tends to crash occasionally for no apparent reason - I put this down to its heavy work load. -

Stephen W. Domleo, Umberleigh, N. Devon.

● The Turbo-driver will speed up your Electron, but the disc system will be pretty much the same.

If you use Modes 0 to 3 you'll find that screen operations and calculations are much faster.

We haven't had any reports of unreliable Turbo Electrons so it's probably safe to assume that it can cope with the extra speed.

Map of the Citadel

I BOUGHT Citadel for my Electron a month ago and I haven't yet finished it.

It would be a great help if you could print a plan of all the rooms and places in your mag.

- **Michael Hughes, Gress-**

ford, Clwyd.

● Can anyone help Michael with a map for Citadel?

More tips

I WOULD like to add to Tim Walter's tips on Citadel. Firstly he mentioned that to get the crystal in the central tower you must jump from the top of the East tower to pull the lever and hence lose a lot of energy.

This is not so. To pull the lever collect the bucket and fill it with water from the cellar.

Take the bucket with the water in to the East fireplace and put the fire out. Then climb up the chimney and you will be able to get to the lever.

Tim did not mention where to put the crystals. Take them to the temple and drop them where the trampoline is. The crystal will disappear and be placed in the sanctuary.

When you have all five crystals in the sanctuary stand on one of the pads in the room to the right of the sanctuary. You will be transported to the palace.

Here you must collect the bejewelled figurine and return to the temple the same way as you came.

You will then have de-

stroyed the teleport system, and if you have 99 points you become ruler of Citadel.

To get 99 points you need the three crowns which are in the following three places:

● Down the bottom of the well - drop the ice crystal at the bottom of the well so you can enter the room to your right where there is a crown.

● In the witch's house - when you get into the witch's house through the chimney and have killed the monk jump into the wall above the ladder.

There you will find a secret passage leading to a room with a crown in it.

● In the cellar - drop the trampoline or barrel where the key is. You will then be able to jump into a secret passage in the roof and walk into a room containing the last crown.

One final point - people may be having trouble with lack of energy.

To help overcome this it is useful to take the blue blocks to Stonehenge, where they will be transformed into 30 or 40 energy units. - **D. Waterhouse, Hinckley, Leicester.**

... and more

THE Key to the Citadel letter in the May 1986 issue of Electron User misinforms people of the correct way to get the fourth crystal.

To put the switch on at the blue wall all that is needed is the green bucket filled with water off the beach to put the flames out at the east fireplace.

Once out there is a passage up the back of the fireplace up to the blue wall at the top.

To get past the monk go part way down the passage and he will stick in the hole and can be easily shot with a spell. - **Paul S. Laech, Seascale, Cumbria.**

ALL programs printed in this issue are exact reproductions of listings taken from running programs which have been thoroughly tested.

However, on the very rare occasions that mistakes may occur corrections will be published as a matter of urgency. Should you encounter error messages when you type in a program

they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Those trying programs . . .

I ENJOY reading Merlin's Cave and Micro Messages. I also like previews for games and advertisements.

My only problem is that whenever I try a program from the magazine they do not work! — **Brian Marum, Ealing.**

● Typing in listings from the magazine might seem easy, but getting them to run afterwards can be much more difficult.

When you have finished entering a program go through it very carefully, line by line, looking for simple typing errors.

Even experts can't type in a listing without making at least one error and usually there are several.

Rest assured that all our listings have been thoroughly checked and if any errors do slip through — a rare occurrence — you'll find the corrections in Micro Messages. Our eagle-eyed readers don't miss much!

Reader's choice

THANKS for a great magazine. I especially like Merlin's Cave and the new graphics series by Trevor Roberts — this really shows what can be achieved on an Electron.

How's about seeing a few software specials on games with a particular theme, such as unarmed combat, aircraft, football and so on?

I would also like to see the return of the Top Ten, as this gives a good idea of which games to buy and which ones to avoid. — **Munro Drive, Edinburgh.**

Tricky problem

IF anybody were to write to Acorn saying that they were thinking of buying a computer and could they have details of the Electron that information would be despatched by return of post free of charge.

However having sold the

WHAT would you like to see in future issues of Electron User?

What tips have you picked up that could help other readers?

Here is your opportunity to share your experiences.

Remember that these are the pages that you write yourselves. So

tear yourself away from your Electron keyboard and drop us a line. And please, if you want a reply, enclose an SAE. The address is:

Micro Messages
Electron User
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY.

Electron Acorn no longer want to know you. In my opinion they act disgracefully toward Electron owners.

Last March I wrote to Acorn Technical Enquiries Dept. at Cambridge, enclosing a first class SAE. My letter of inquiry has been completely ignored.

As a pensioner I can ill-afford to waste postage stamps and envelopes. Could it be that Acorn are in such dire straits that they resort to steaming off postage stamps to reuse themselves?

If you publish this letter it may at least shame them into refunding the 34p I have wasted.

In view of the fierce competition in the computer industry it is strange that firms can be so indifferent and dilatory.

My simple inquiry to Acorn was requesting a foolproof method of preventing program listing. In June 1985 Electron User you published a method in response to a reader's request, but I found I could break it.

However there must be a system, as proved by Mini Office and other commercial tapes. — **J. Rayner, Mansfield, Notts.**

● You may have made a simple request but the solution is far from simple.

Simple protection systems are simple to break into — you'll find such a system in Micro Messages in our June 1986 issue.

Software companies employ protection experts — programmers who specialise in protection systems.

These programmers can provide you with a system that will foil 99.99 per cent of all pirates and hackers, but they aren't cheap and will provide you with a hefty bill.

Lost for words

I HAVE just bought Commando by Elite for my Electron. It's not a bad game but why is it so slow?

In the April edition of Electron User you said that Superior Software were producing Speech! for the Electron.

A friend immediately placed an advanced order for Speech!, but in the May edition you said that they were not bringing it out. Which statement is true? — **Darren Wray, Ryde, Isle of Wight.**

● The Electron version of Commando is quite slow at times. Owners of Slogger's Turbo Driver will find it a fast and exciting game to play.

Superior Software at first thought that it may be possible to convert Speech! to the Electron, but had to abandon it as they found it impossible.

Teletext adapter

IN your October 1984 issue it was mentioned that Sir Computers of Cardiff had brought out a Mode 7 adapter for the Electron.

However on inquiring at a local computer shop I was told that they had gone bust.

In the May 1986 issue you said that Morley Electronics have brought out a teletext adapter for use with the Electron with built in Mode 7.

Are there any other firms which produce a Mode 7 adapter? If not, are there likely to be any companies doing so in the near future? — **Chris**

Willis, Choppington, Northumberland.

● The Morley teletext adapter is the only one available for the Electron, and we haven't heard of any other companies planning to produce one.

Circle of triangles

I FOUND Trevor Robert's Circle of Triangles program in the March 1986 Notebook interesting but not very efficient.

After all, when you've added the extra lines to make it loop five times the program calculates the x and y coordinates for every loop.

Why not, I asked myself, just calculate all the values of x and y once and for all, storing them in an array? Then the program can just reference these values from the loop instead of having to calculate them anew each time round. The result is the enclosed program:

```
10 REM CIRCLE OF TRIANGLES
20 REM TREVOR ROBERTS
30 MODE 0
40 DIM X(24),Y(24)
50 VDU 29,640,512;
60 BCOL 3,3
70 degree=0
80 FOR loop=1 TO 24
90 angle=RAD(degree)
100 X(loop)=200*SIN(angle)
110 Y(loop)=200*COS(angle)
120 degree=degree+15
130 NEXT loop
140 FOR outer=1 TO 5
150 FOR inner=1 TO 24
160 x=X(inner):y=Y(inner)
170 PROCtriangle(x,y)
180 NEXT inner
190 NEXT outer
200 END
210 DEF PROCtriangle(x,y)
220 MOVE x,y
230 PLOT 1, 50,50
240 PLOT 1,50,-50
250 PLOT 1,-100,0
260 ENDPROC
```

It is much faster than the earlier one. — **Guy Wicker, Sheffield.**

● Trevor says that you're right.

the program is a lot better your way.

He points out in mitigation that he only had a limited amount of space to explain the original listing without going into arrays.

Screen dump

DO you know of a suitable screen dump for the Epson MX-80 dot matrix printer as the one in the March 1985 issue doesn't work with my printer. — **Stuart Toller, Thornbury, Bristol.**

● You must have made a typing error. Actually you'll find an excellent dump suitable for Shinwa and Epson printers in the June 1986 issue of *Electron User*.

Listing Sphinx

HERE is a method for listing *Sphinx Adventure* by Paul Fellows without the need for a bad program fixer:

CHAIN *Sphinx* as usual. When it has loaded crash the program by typing GO RENUMBER RENUMBER RENUMBER RENUMBER, by holding down the Function key and B until you hear the string-too-long beep.

Press Return and then enter:

```
!TOP=&FF00
```

Finally LIST as usual. — **David Patrick, Neilston, Glasgow.**

Electron's OS

WHAT OS has the present *Electron* got? If it is 1.2 is it possible to upgrade from OS 1.0 to OS 1.2?

I got my computer about 19 months ago and I have an OS of 1.0. — **E.A. Pearson, Ipswich, Suffolk.**

● There is only one version of the *Electron's* operating system — 1.0. This is equivalent to the BBC Micro's OS 1.2.

Keeping track of memory

CAN you help me with a few minor problems on my *Electron*?

Firstly I bought *Mini Office* which I find invaluable. However I have a problem with the spreadsheet program.

If I type in a lot of figures and formulae I occasionally get an error message saying 'no room at . . .' at which point the program breaks and I cannot retrieve the inputted data.

Is there any way of avoiding this by finding out how much memory is left, or by retrieving the information?

Secondly since I have got a Plus 1 interface I sometimes get the error message 'EVALEND' displayed when loading recorded tapes. What does it mean and what is its effect on the computer?

I cannot find any reference

to it in my manual or in the booklet supplied with the Plus 1.

Thirdly I have bought a Brother HR-5 thermal transfer printer and the problem is getting the in-built functions to work.

In the manual the instructions say LPRINT or PRINT 1 but these do not work on my *Electron* and error messages are displayed.

Also is there a screen dump program for this printer, or does the Epson screen dump work on it?

Finally I am stuck on *Sphinx*. I can get as far as the serpent but, despite trying to set fire to something I still cannot get out. What is it I set fire to, and what command do I use?

The only way I have found of getting out is to rub the ring

but that only lands back in the sorcerer's lair. — **David J. Meleleu, Wellingborough, Northants.**

● Unfortunately there's no indication of the amount of memory left, so stick to small numbers of figures and simple formulae.

If memory is a problem then you need a ROM-based spreadsheet, such as *Viewsheet* from Acornsoft. This will set you back about £25.

We've never had the error message you describe so we're stumped. Can anyone help?

Have a look at *Micro Messages*, May 1986 for help with your printer.

The January 1986 issue of *Electron User* contained a special on *Sphinx* with a complete solution.

Disc filing system

MY son and I decided to get a disc filing system for our *Electron* and we opted for Solidisk's EFS interface and a disc drive with PSU.

However three interfaces later, we are back to square one. Each arrived without a protective cover and was unworkable.

We have had no better luck with the disc drive. We sent off to Viglen for one with PSU, but were told that there had been an error in the advert and the price was in fact higher than stated.

We then decided to order one we could afford from Watford Electronics, but again we found the price had risen.

Surely these companies should have more reliable marketing strategies. They seem to advertise goods which they don't have in stock and for which they can't guarantee a price.

Can you recommend a reliable company which will provide a workable system at an acceptable price. We are not interested in the Plus 3 or the Cumana. — **C. Wood,**

Howden, Livingston.

● If you've tried the Solidisk interface and you're not interested in the Plus 3 or Cumana interface, that only leaves Advanced Computer Products Plus 4 disc interface. This was reviewed in the June 1986 issue of *Electron User*.

It is an excellent interface and is the one we use in the office. ACP can also supply a suitable drive.

Compatible

WE have a regular subscription to *Electron User* but we no longer have an *Electron*, only BBC B with an Econet system.

Could you tell me which games listings are fully compatible with the *Electron* and BBC Micro?

Fruit Worm from the January 1986 issue will not run, even after removing any obvious bugs. — **F. Scoote, Mayfield Middle School, Ryde.**

● Not all *Electron User* listings run on the BBC Micro. Basically the simpler the program the greater the chance of it working.

Fruit Worm is a complicated machine code program which isn't compatible

with the BBC Micro.

However the author has converted it to run on it and *The Micro User* will be publishing it shortly.

Incompatible

I HAVE reached the tenth Dan in *The Way Of The Exploding Fist* by Melbourne House.

When I completed it the game just carried on at the same level which was a bit disappointing.

The way to beat the harder opponents is to jump over them and jump back quickly so that they have their backs to you.

Then you can kick or punch them. You must be careful though that you jump back quickly or you will be hit.

My high score on *Fist* is 71,900. I think it is the best game on the *Electron* but I can't get it to work on joystick.

I have a First Byte joystick interface. Can you help? — **Andrew Hagan, Hornchurch, Essex.**

● We've had a few letters saying that *Exploding Fist* doesn't work with joysticks plus First Byte interface. It sounds like the two aren't compatible.

Listings galore!

Save yourself the chore of typing in listings by sending for our monthly tapes, packed with games, utilities, graphics and other programs from the pages of *Electron User*.

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ROYAL WEDDING Celebrate the royal event with our ingenious sliding block puzzle. **SNAPDRAGON** Two player version of the classic card game. **ATTRIBUTES** Colourful two player strategy game. **FORMATTER** Make your listings easier to read. **DISCS** Extended star commands. **EXTRA COMMANDS A WHILE** ... **WEND** command for your micro. **PLUS** superb digitised picture of Andrew and Sarah.

On the June 1985 tape:

FISHING Enjoy a quiet day by the river, and maybe catch your tea as well! **TACTICAL PURSUIT** A two player strategy game played with pawns on a chess board. **MINIBASE** Create an electronic telephone directory. **EXTRA COMMANDS** Add more commands to Basic. **SCREEN DUMP** Multi-tone screens dumps for Epson compatible printers.

On the May 1985 tape:

MISSILE JAMMER Defend the city of Pezine from a missile invasion. **VECTOR LETTERS** Use *LINE to create double height text. **DEGREES** Convert from Centigrade to Fahrenheit and vice-versa. **CROCODILE TEARS** Spell well or end up as a crocodile's dinner. **ZAP** Blast the marauding aliens. **EXTRA COMMANDS** Adding new keywords to Basic.

On the April 1985 tape:

INVASION FORCE Exciting zap 'em space game. **EASTER EGG HUNT** Seasonal game using compass points. **BACH TO BASICS** Music tutor. **NOTICE BOARD** Text scrolling utility. **SEARCH and RECOVER** Two routines from the disc article. **NOTEBOOK** Recursion backwards.

On the March 1985 tape:

GRAND PRIX Exciting race game. **DICER** A clever test of strategy. **MARCHING ORDER** Counting and ordering numbers. **FIND AND REPLACE** Useful editing program. **SECTOR EDITOR** Excellent disc utility. **TIMEPIECE** Superb graphics demonstration. **OXO** Game of cunning. **TRICIRC** A circle of triangles.

On the February 1985 tape:

NECROMANCER Superb text adventure. **GREBIT** Arcade action. **FAST BACKUP** Disc utility. **MACHINE CODE** How to write an arcade game. **TAPEDISC** More software transferring techniques. **SEAWAYS RAM** Example program.

On the January 1985 tape:

FRUIT WORM An arcade classic. **HELICOPTER RESCUE** Pilot an air sea rescue helicopter. **MACHINE**

CODE Detect collisions between sprites. **TAPEDISC** Transfer your software to disc. **MODE012** Multi-Mode screens.

On the December 1984 tape:

GET SET SANTA Christmas fun collecting presents. **MISSILE ATTACK** Save your cities! **PROGRAM PROBE** Using joysticks. **SPACE COUNT** Counting for youngsters. **CHRISTMAS CARD** Cards and cards for all. **DISC MENU** Disc Menu creator.

On the November 1984 tape:

KARATE WARRIOR Electrifying combat. **ULA Mode 6 Mode 7** **PAINT ROLLER** Colourful arcade action. **DEFUSE** Beware the bombs. **SPRITE PRINT** Machine code graphics utility. **TRAIN** Far from stationery graphics.

On the October 1984 tape:

DUNGEON QUEST An amazing all action arcade adventure. **PILOT** Computer assisted learning language. **HAVING ROLLER** Arcade action in the garden. **TRAIN** Animated action. **KALEIDOSCOPE** Colourful graphics action.

On the September 1984 tape:

TEXNDAN 3D Wild West shootout. **PINTCURSOR** Machine code graphics. **SPRITE/ED** Sprite editor. **COMPOSE** Writing music simplified. **REVERSI** Cunning strategy game. **SIMPLEFILE** Save and read data. **BOUNCE BALL** Two player action. **ROTATE** Animation in a spin.

On the August 1984 tape:

DIGGA Exciting arcade action beneath the earth. **DODGE THE ASTEROIDS** Fun deep in space among the asteroids. **M/CODE GRAPHICS** Sliding pints of beer! ***FX** The OS explored. **MOVEIT** An intriguing sliding puzzle. **HEXGRAM** An educational game to increase your word power.

On the July 1984 tape:

MANIC MOLE Machine code action at its best. **HIGHER OR LOWER** Guess the card. **TIME BOMB** Carefully collect TNT. **M/CODE GRAPHICS** Two demonstrations. **FX1/2** The OS on call. **PIRATE MATHS** Sum fun. **NOTEBOOK** Password Generator.

On the June 1984 tape:

QUASIMODO Battering classic. **DISASSEMBLER** Machine code utility. **ACTIVITIES** Educational fun. **REFLECT** Aggressive aliens. **ENGINE** Animation. **DODGE** Race track action. **STRINGALONG** Scrolling fun. **CASTLE** Medieval graphics. **MATHS CURVE** Angles and art. **NOTEBOOK** Trees.

On the May 1984 tape:

SKRAMBLE! Compulsive arcade action. **SHEEPNIM** The logic game.

TEXTWRITER Screen utility. **LIFE** A cultured classic. **CEDRIC** Educational fun. **THREE-D** Outstanding utility. **SPOKES** Fascinating graphics. **MOONORBIT** Heavenly displays. **BLAZON** Heraldic devices. **FLOWERS** A Basic bouquet. **NOTEBOOK** Annotated animation.

On the April 1984 tape:

SUPER ARCHER Target practice. **BINARY SEARCH** Search data efficiently. **JOYPLUS** Switched joystick routine. **ODD ONE OUT** Educational fun. **POLYGONS** 3D rotation. **MONEY CRAZY** Arcade action. **STARCHART** The night sky. **FORTUNE TELLER** Horoscope. **COLLISION DETECTION** Alien encounters. **HILO** Guessing game. **NOTEBOOK** Hello to assembler.

On the March 1984 tape:

MR. FREEZE Ice cube arcade action. **SCREENDUMP** Two procedures for printer dumps. **FILLER** The machine code fill routine. **FRED'S WORD GAME** Educational fun. **BIG LETTERS** Large text utility. **PERCY** Boat the burning fuse. **ANIMATION** Two example programs. **PIGS** Flying bacon. **NOTEBOOK** Display formatting.

On the February 1984 tape:

CRAAL The mystifying maze adventure. **BOUNCY** Addictively annoying action. **PAIRS** Can you remember the cards? **BASE A** Binary/hexadecimal conversion utility. **CATCHER** Collect the eggs before they break. **CLOCK** Time-keeping utility. **RACER** Grand Prix action. **NOTEBOOK** Graphics windows. **TRIG** All the right angles.

On the January 1984 tape:

SPACE BATTLE Destroy the deadly descending aliens! **NEW YEAR** A sound and graphics greeting. **ESCAPE FROM SCARGOV** Minefield action. **PIE CHART** Statistics made simple. **CLAYPIGEON** An Electron birdshoot. **ORGAN** Music maestro please! **NOTEBOOK** An original program. **RANDOM NUMBERS** Or not so random! **SNAKES** Reptilian arcade action. **CHEESE RACE** Best rival mice.

On the December 1983 tape:

CHRISTMAS BOX Align the presents logically. **SILLY SANTA** Sort out the muddle. **SNAP** Match the Xmas pictures. **RECOVERY** The Bad Program message tamed. **CAROL** Interrupt driven music. **AUTODATA** A program that grows and grows. **NOTEBOOK** Simple string handling.

On the November 1983 tape:

STAR FIGHTER Anti-alien missions. **SCROLLER** Wrap around machine code. **URBAN SPRAWL** Environmental action game. **SPELL** Alphabetic education. **JUMPER** Level headed action. **CAESAR** Code breaking broken. **KEYBOARD** Typing game.

On the October 1983 tape:

BREAKFREE Classic arcade action. **ALPHASWAP** A logic game to strain your brain. **SOUND GENERATOR** Tame the Electron's sound channels. **MULTICHARACTER GENERATOR** Complex characters made simple. **RIGEL 5** Out of this world graphics. **MAYDAY** Help with your morse code. **NOTEBOOK** Palindromes and string handling.

On the September 1983 tape:

HAUNTED HOUSE Arcade action in the spirit world. **SPLASH** A logic

game for non-swimmers. **SORT SHOWS** How sorting algorithms work. **SHORT TIME** The time they take. **CLASSROOM INVADERS** Multicoloured characters go to school. **SAILOR** Nautical antics. **MATHS TEST** Try out your mental powers.

On the August 1984 tape:

SANDCASTLE The Electron seaside outing. **KNOCKOUT** Bouncing balls better brick walls. **PARACHUTE** Keep the skydivers dry. **LETTERS** Large letters for your screen. **SUPER-SPELL** Test your spelling. **ON YOUR BIKE** Pedal power! comes to your Electron. **SCROLLER** Sliced strings slide sideways.

On the July 1984 tape:

GOLF A day on the links with your Electron. **SOLITAIRE** The classic solo logic game. **TALL LETTERS** Large characters made simple. **BANK ACCOUNT** Keep track of your money. **CHARTIST** 3D graphs. **FORMULAE** Areas, volumes and angles.

On the June 1984 tape:

MONEY MAZE Avoid the ghosts to get the cash. **CODE BREAKER** A mastermind is needed to crack the code. **ALIEN** See little green men - the Electron way! **SETUP** Colour commands without tears. **CRYSTALS** Beautiful graphics. **LASER SHOOT OUT** An intergalactic shooting gallery. **SMILER** Have a nice day!

On the May 1984 tape:

RALLY DRIVER High speed car control. **SPACE PODS** More aliens to annihilate. **CODER** Secret messages made simple. **FRUIT MACHINE** Spin the wheels to win. **CHASER** Avoid your opponent to survive. **TIC-TAC-TOE** Electron noughts and crosses. **ELECTRON DRAUGHTSMAN** Create and save Electron masterpieces.

On the April 1984 tape:

SPACEHIKE A hopping arcade classic. **FRIEZE** Electron wallpaper. **PELICAN** Cross roads safely. **CHESSTIMER** Clock your moves. **ASTEROID** Space is a minefield. **LIMERICK** Automatic rhymes. **ROMAN** Numbers in the ancient way. **BUNNYBLITZ** The Easter program. **DOGGUCK** The classic logic game.

On the March 1984 tape:

CHICKEN Test your nerve. **COFFEE** A tantalising word game. **PARKY'S PERIL** Parky's invisible maze. **REACTION TIMER** How fast are you? **BRAINTEASER** A puzzling program. **COUNTER** Mental arithmetic. **PAPER, SCISSORS, STONE** Out-guess your Electron. **CHARACTER GENERATOR** Create shapes.

On the February 1984 tape:

NUMBER BALANCE Mental arithmetic. **CALCULATOR** Make your Electron a calculator. **DOILIES** Patterns galore. **TOWERS OF HANOI** The age old puzzle. **LUNAR LANDER** Test your skill. **POSITRON INVADERS** The old arcade favourite.

On the introductory tape:

ANAGRAM Sort out the jumbled letters. **DOODLE** Multicoloured graphics. **EUROMAP** Test your geography. **KALEIDOSCOPE** Electron graphics run riot. **CAPITALS** Now upper case letters. **ROCKET, WHEEL, CANDLE** Three fireworks programs. **BOMBER** Drop the bombs before you crash. **DUCK** Simple animation. **METEORS** Collisions in space.



See order form on Page 53

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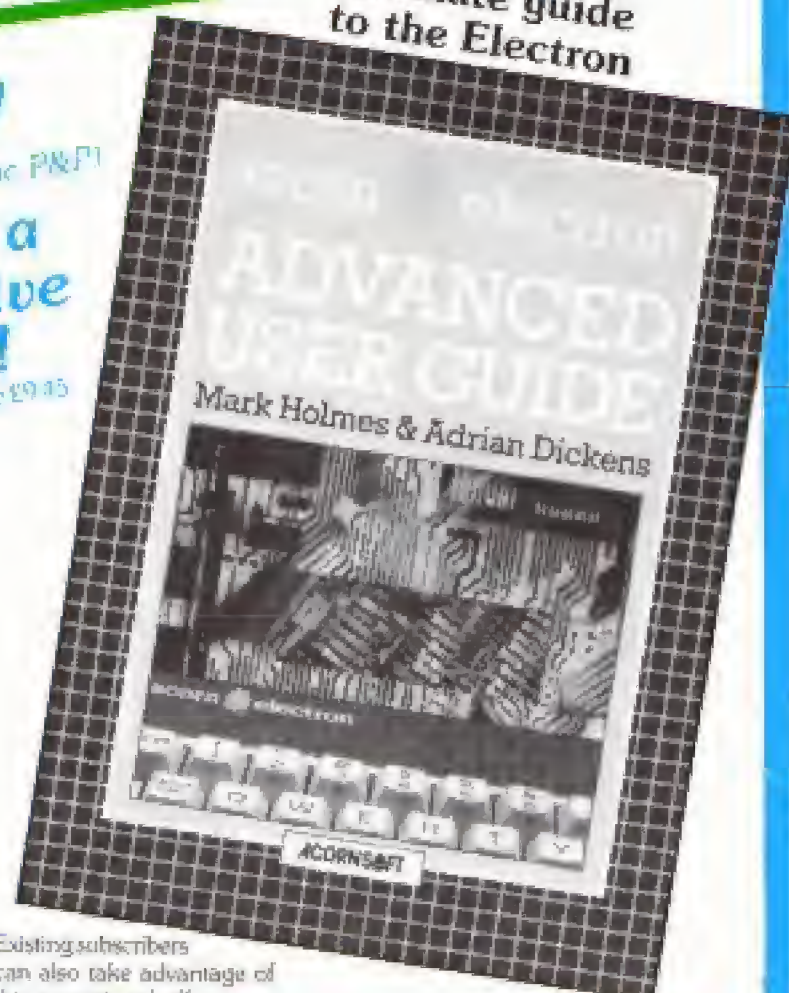
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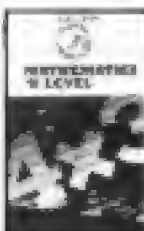
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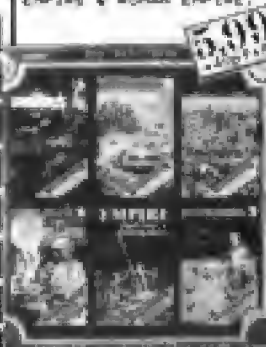
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Formatter

THIS is a machine code utility designed to make long listings of programs easier to read. When run it adds the new star command FORMAT to the operating system.

Long and complex lines where there are several statements separated by colons are often difficult to follow in a listing — especially on a screen in 40 column mode. So after entering:

***FORMAT**

these multi-statement lines will be split up and listed with each of the statements on a separate line. When you've finished enter:

***FORMAT**

again and formatting will be switched off. If you forget to switch it off before running a program you may find the program acting peculiarly as

Formatter will format the text.

It works by intercepting the oswrch vector, since all text printed on the screen or printer passes through this.

Each character is checked to see if it is a colon and when one is found a carriage return, line feed and five spaces are printed before sending the colon.

The oscli vector is also intercepted by the routine. All star commands pass through this.

Any star command entered is checked to see if it is FORMAT. If it is it jumps to our routine, if not it jumps to the operating system as normal.

The Break vector is intercepted so that the routine will still function after Break or Control+Break.

Leave out lines 580, 590 and 600 until you have the program working correctly as these alter the vector.

How to make long programs easier to read

By **KEITH TRANGMAR**

```
10 REM Listing Formatter
20 REM By Keith Trangmar
30 REM (c) Electron User
40 FOR PASS=0 TO 2 STEP 2
50 PX=&900
60 command=&70
70 wrchv=&72
80 cliv=&74
90 flag=&76
100 colon=&77
110 OPT PASS
120 \
130 \ Change vectors to point to user routine
140 .break
150 BCS set_up:RTS
160 .set_up
170 CL:
180 LDA#0:STA flag
190 LDA &200:STA cliv
200 LDA &209:STA cliv+1
210 LDA &20E:STA wrchv
220 LDA &20F:STA wrchv+1
230 LDA#clint MOD256:STA
```

```
&200
240 LDA#clint DIV256:STA
&209
250 LDA#start MOD256:STA
&20E
260 LDA#start DIV256:STA
&20F
270 SEI
280 RTS
290 \
300 \ Identify *FORMAT command
310 .clint PHP:PHA:STX command:STY command+1:LDY#1
320 .check_loop LDA (command),Y:CMP format,Y:BNE not_format:INY:CPY#6:BNE check_loop
330 \
340 \ Print 'Ok.'
350 LDA#79:JSR oswrch:LDA#107:JSR oswrch:LDA#46:JSR oswrch:JSR &FFE7
360 INC colon:LDA command
```

```
:CLC:ADC#6:BCC skip2:INC command+1
370 .skip2 TAX:LDY command+1:PLA:PLP:RTS
380 .not_format PLA:PLP:LDX command:LDY command+1:JMP (cliv)
390 \
400 \ Check for colon being printed
410 .start CMP#5B:BEQ check:CMP#34:BNE oswrch:INC flag
420 .oswrch JMP(wrchv)
430 .check LDA colon:AND#1:BNE test
440 .print_colon LDA#50:JMP oswrch
450 .test LDA flag:AND#1:BNE print_colon
460 \
470 \ New line and tab
480 JSR&FFE7:LDX#5:LDA#9:.loop JSR oswrch:DEX:BNE loop
```

```
op
490 JMP print_colon
500 .format EQU$*FORMAT*
510 J:NEXT
520 CALL set_up
530 ?colon=0
540 REM *THIS:BIT:IS:IN:5 PEECH:MARKS.*
550 REM::BUT:THIS:BIT:IS:NOT !:
560 *KEY1 L:INIM
570 *FX130,0,129
580 *FX247,76
590 *FX248,0
600 *FX249,9
610 *FORMAT
```

This listing is included in this month's cassette tape offer. See order form on Page 53.

EXCITING news this month is that Robico has released *Project Thesius*, the follow up to *Rick Hanson*. It is subtitled *Rick Hanson II* and seems every bit as good as the last one.

Another new release is Gilsoft's *Quill*, which I hope to review next month. Shards also told me that it will have released a new game by the time you read this.

Called *Operation Safras* it will be presented in the same manner as *Woodbury End* and I look forward to seeing it.

I'm afraid I also have some bad news. I can no longer answer letters personally on problems in adventures.

My mailbag has been increasing steadily since I started this column and I now get over 100 letters a week, which leaves me little time to research and write the column.

I would ask those of you who are waiting for an answer to be patient while I clear the backlog.

Of course I still want you to write in with your problems and I will answer them through these pages.

I get great enjoyment from reading your opinions so please feel free to write in – if only for a chat.

I would like to point out though that about 90 per cent of the questions I am asked

have already been answered in the column at some time, so it is always worth checking your back issues.

For anyone in desperate need of help I am starting a new section called the *Lords of Adventure*.

If you can help readers with any adventures let me know and I'll publish your name, address and the games you can help with. I'll make you one of my *Lords of Adventure*.

Citadel seems to be prompting a lot of mail and I am sure that anyone offering

help would be much appreciated.

This month also sees the first *Top Twenty*. It has been compiled from all the marks sent to me over the last year.

Apart from the position that each game earned I have also given the average mark that each received. As you can see from the chart it has been very close.

Epic unsurprisingly won top spot and managed to get all of its range into the *Top Ten*. I wonder how they will fare against the new competition from Robico in the coming year?

Melbourne House has also done well in getting its three games into the *Top Ten*.

Woodbury End is a recent release from Shards and has done superbly to get into the charts in so short a time.

Keep your marks coming in for the next *Top Ten*.

Ian Ruthven who has sent in tips for *Twin Kingdom Valley* which I will be revealing in the future has also asked for help with *Citadel*. Any *Lords of Adventure* care to oblige?

Guy Richardson asked for *Merlin's* help but didn't specify what with. What do you want help with Guy? Unfortunately my magic powers don't stretch to mind reading.

Nail Sedgwick came up with two worthwhile suggestions for software houses. Firstly, enclose a second cass-

ette with the adventure to be used as a save-game tape.

This would avoid the need to search through various cassettes for the right tape – especially useful if you haven't played the game for a while.

Secondly, why not have a compilation tape of adventures? Quite often when compilation tapes are released there are a couple of games and one adventure so why not have all adventures?

I agree with both of these suggestions. Neil – software houses please note.

Richard Jay is compiling a database of adventure clues and asks me to print his name and address so that readers can send him maps and solutions for it.

You can write to him at 102 Highcliffe Road, Wickford, Essex, SS11 8JX.

I'm not quite sure how you stand with copyright laws if you market this Richard, but I would think it only fair to give copies of your database to any reader who writes in.

W.E. Trevelyan asked if I would indicate the age level that a program is aimed at when I review it.

He goes on to suggest that *Adventureland* is aimed at players up to the age of 12, the *Epic* games at astute 14 to 15 year olds and *Hampstead* at the 18+ age range.

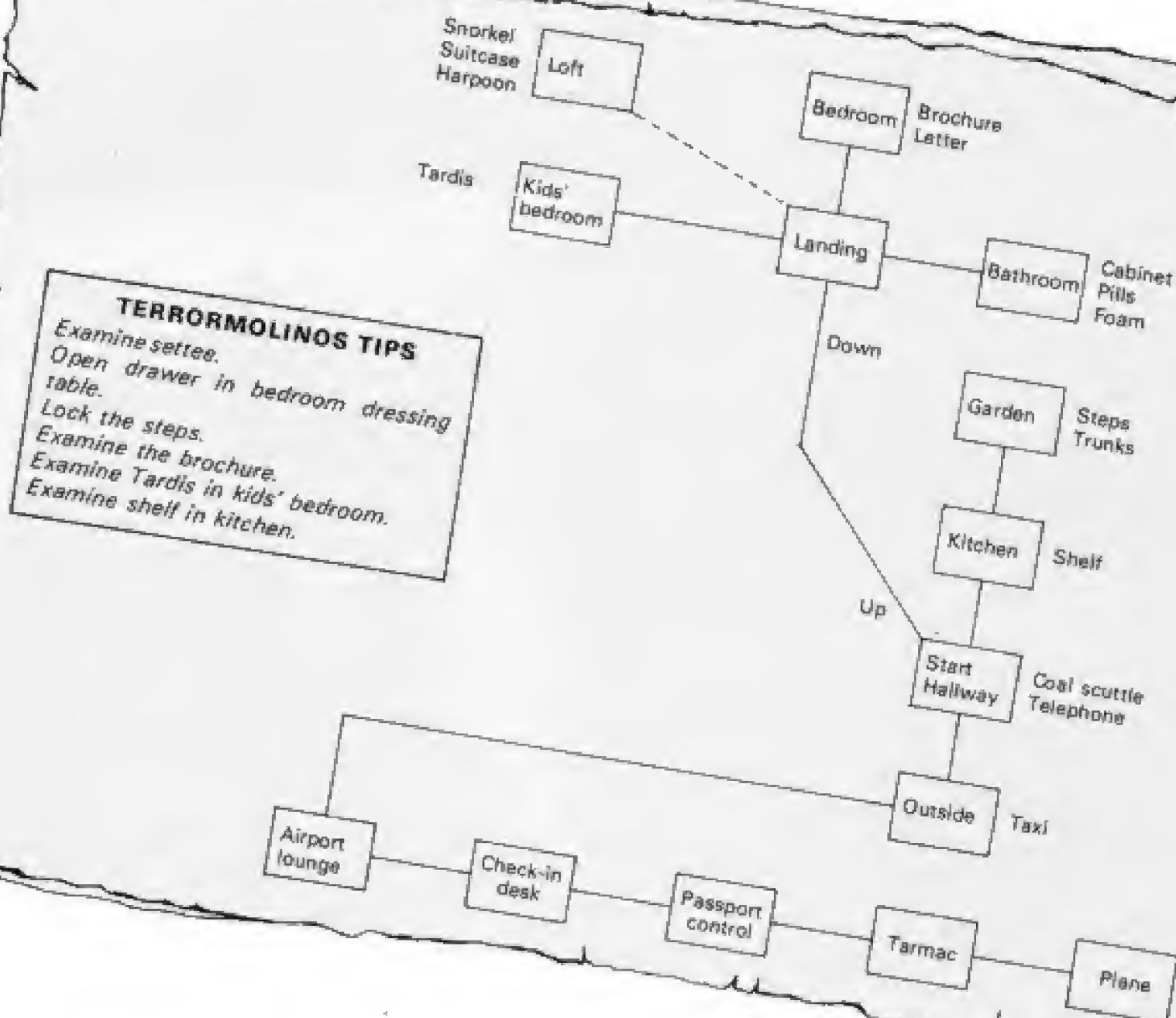
Frankly I don't think you can categorise adventures this way. *Adventureland*, the first



Rick Hanson's back, as lively as ever

Adventures Top 20

1	Wheel of Fortune	Epic	91
2	Castle Frankenstein	Epic	86
3	Classic Adventure	Melbourne House	84
4	Kingdom of Klein	Epic	83
6	Countdown to Doom	Acornsoft	82
	Hampstead	Melbourne House	
	Terrormolinos	Melbourne House	
8	Woodbury End	Shards	81
9	Twin Kingdom Valley	Bug-Byte	80
10	Quest for Holy Grail	Epic	79
	Eye of Zoltan	Softek	
12	Spiderman	Adventure Int.	78
13	Sphinx Adventure	Acornsoft	77
14	Greedy Dwarf	Dorling Kindersley	76
	Strange Odyssey	Adventure Int.	
	Staff of Law	Potter	
17	Pirate Adventure	Adventure Int.	75
18	Adventureland	Adventure Int.	74
	Five Stones of Anadon	Softek	
20	Galadriel in Distress	Potter	73
	Incredible Hulk	Adventure Int.	



home computer adventure, first saw light of day on a TRS-80.

In those days a 12-year-old would be unlikely to have access to the computer, let alone the game itself.

I respect all my reader's opinions, but in this case I would like to point out that I have received letters from people aged between 5 and 75 about the games you mention.

I feel that the only way to categorise an adventure is by how difficult it is compared to its cost. Even then it is only

one opinion and will obviously differ from person to person.

Incidentally my "inexplicably cool opinion" about Hampstead was due to it relying too heavily on humour for atmosphere, and since the humour didn't appeal to me I didn't feel there was any atmosphere.

I appreciate that it is a complex adventure and its popularity in the Top Twenty proves that most readers like it, but I didn't. Terrormolinos on the other hand appeals immensely to me.

Marlin

Hall of Fame

Woodbury End

Les Shipton

The Help clues continued -

● Office hours suffice. Get the keys from the Mayor's office between the hours of 8 and 5.

● Open Sesake. Go into the records office and start reading the report.

● Pick a so near give cheer. Examine the print for the combination to the shed. Don't take the print with you though.

● Digital do-it-all. Getting the cube from the shed.

● Well can you handle that. Turn the well handle and look.

Wheel of Fortune

Craig Romans

You will now be underground so use the lamp, but since you are in real time be careful not to waste it.

Collect as much treasure as you can, but make sure you work your way south and go into the fly's cave and back out

into the spider's cave - don't waste time though.

Now get the wheel and go back to the fly's cave for the penny. Decide for yourself what you want to leave underground, but make sure you keep the basket.

Go to the steps and up to the trapdoor. Unbolt it and go up into the building.

Now go to the machine and insert the penny. Go back to the building and leave all your treasure except the music box. Now spin the wheel.

Spiderman 2

Robert Henderson

Go to floor 1 and give the calcium to the lizard. Go into the hall and shoot a web at the big gem. You can now take it.

Go to the sandman's room, then up on to the ceiling and

Contact Corner

If you want an adventure pen-pal why not write to one of the readers mentioned here.

Anyone who wants their name included should write in, making sure that their name and address is legible.

- Jason Harken, 156 Black-a-tree Road, Nun-eaton, Works. CV10 8AG.
- Mike Lacey, 397 Baker Street, Alvaston, Derby DE2 8SJ.
- Alan Jones, 5 Hayes Close, Newtown, Bristol BS2 0AG.

From Page 57

LOOK CRIB. Get the formula then look again and get the gem.

Drop the formula, **GO FLOOR** and leave the room. Go to floor 2 then outside until you are floating.

FEEL NORTH, get the gem, go south and **FEEL SOUTH** and get the other gem. Then **JUMP UP**, take the mesh and enter the fan.

Keep shooting web at it until its speed falls to 50 RPM. Now shoot a web at the button and **CRAWL FAN**. Keep going down until you see Dr. Octopus.

Gisburne's Castle Paul James

Use the oil on the rusty door to free it, then open it with the key. Use the potion to reduce your size. The spade is used in the dungeons to get to the cellar, and the cannon ball and gunpowder are used to load

the cannon. If you have found the cannon you have also found Gisburne. Finally use the flint to fire the cannon and kill him.

The Count A.J. Haynes

Day 1. Get up and wait for the bell to ring. Go to the front door and take the postcard.

Now go to the kitchen and lower the dumb waiter when you have entered it. **GO ROOM**, take the clip from the postcard and pick the lock.

Keep the clip but store all the other objects in the room with the century worth of dust. Lock the door and go to bed and sleep.

Revenge of Zor H.J. Bastien

Search for the courtyard for a rope and frisk the guard for a whistle. Throw and pull the rope to free the grating.

Throw the rope again and climb it. Now blow the whistle in the forest to get a fly swatter

and push the altar and read the book. The book gives the ingredients to use in the mixing bowl. Kill the flies with

the swatter, then drop them to make the frog appear. Finally throw the net to catch the frog and bat.

Feedback

Dave Frankham has sent in a map and solution to **Gisbourne's Castle**. If anyone wants a copy please send an sae.

Incidentally, Dave, I'd recommend either the Epic or Robico range for your next adventure.

J. Foggitt offers help on Nicholas Latham's problem with **Bored of the Rings**.

After leaving the downs go along the East/West road until you are next to the mountain.

There is an exit North here which leads to the mountain where you'll find a bag of pepper.

Go to the Morona gate, collecting your friends from

Riverdull along the way, and then drop the bag. One of your friends will sneeze and provide a means of getting through the gate.

W.E. Trevelyan reveals that Lou Carey is wrong to say that in **Galadriel in Distress** both the bottle and the goblet contain poison.

It is in either one or the other depending on a ransom spin of a coin. The Loremaster will tell you which is safe and which is not.

M. Alexander has sent in a solution to **Sphinx Adventure**. An sae please if you want me to send you a copy.

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Little 'uns learning to play, and playing to learn

MANY parents have bought an Electron for children with some hope that it might help in their education. For teenagers this could mean buying an exam revision package, but for youngsters aged less than 11 the computer may seem a white elephant.

Its main use appears to be for shooting aliens or outwitting gorillas, and most people do not think of such arcade games as educational.

The aim of this article is to help parents and children get a bit more education from the Electron, while still keeping that vital element of fun.

Let's start with the very young - the under-fives or non-readers. There are quite a number of programs aimed at this age range which can help

to teach a range of skills.

These may involve colour matching or recognising similar shapes. Children may be required to compare the attributes or features of pictures, or organise a sequence of events.

This may not sound like traditional learning, but for a child to be a successful scholar he or she must develop good visual discrimination and be able to plan a course of action.

In fact the skills of visual discrimination, matching and sequencing are vital for any child who is learning to read.

Programs for pre-readers can often be found in magazines. The Simon game, for instance, encourages memory and sequencing.

Pelmanism is a memory game, and on the computer it

stimulates cooperation with other people rather than competition.

Examples of these types of programs can be found in the Fun School series (Page 51).

Mirrorsoft produces excellent software for youngsters. The funny and stimulating Mr Men programs are highly recommended.

Arcade games have value too. One like Acornsoft's Snapper is fairly easy to play and encourages good hand and eye coordination and a bit of forward planning.

However don't expect under-fives to sit at the computer on their own. Contact with a sympathetic adult is essential.

A grown up can ensure that the computer is used sensibly. There seems little point, for instance, in getting children to count balloons on a screen when real objects can be handled.

Mathematics, though, is a symbolic representation of reality. The Electron can be a real help with learning the value of a number and the symbol used for it.

Choose one which gives a good graphic and sound reward for success. However make sure that the failure routine is not so interesting that kids will be encouraged to get things wrong.

There are a number of programs for children who have acquired the rudiments of reading. A favourite of many

five and six year olds is Podd published by ASK.

Podd is a large figure who can do 120 things. All youngsters have to do is type in a "do" word. If Podd can do it he graphically does it. If he can't he says he's sorry.

ASK has deliberately not supplied a list of the things that Podd can do, so children and the adults who help them must use their own ideas.

It's a very simple program that encourages little ones to think, spell accurately and use their imagination.

For early readers there are various levels of Read Right Away from Highlight Software. These provide practice at matching beginnings and endings of words and help children to learn about the sounds groups of letters make.

Like the Mirrorsoft Mr Men programs, they will cater not only for new readers, but for competent ones too.

When selecting software to assist with reading make sure it is suited to your child's ability. If the program is too difficult for a child boredom will quickly set in.

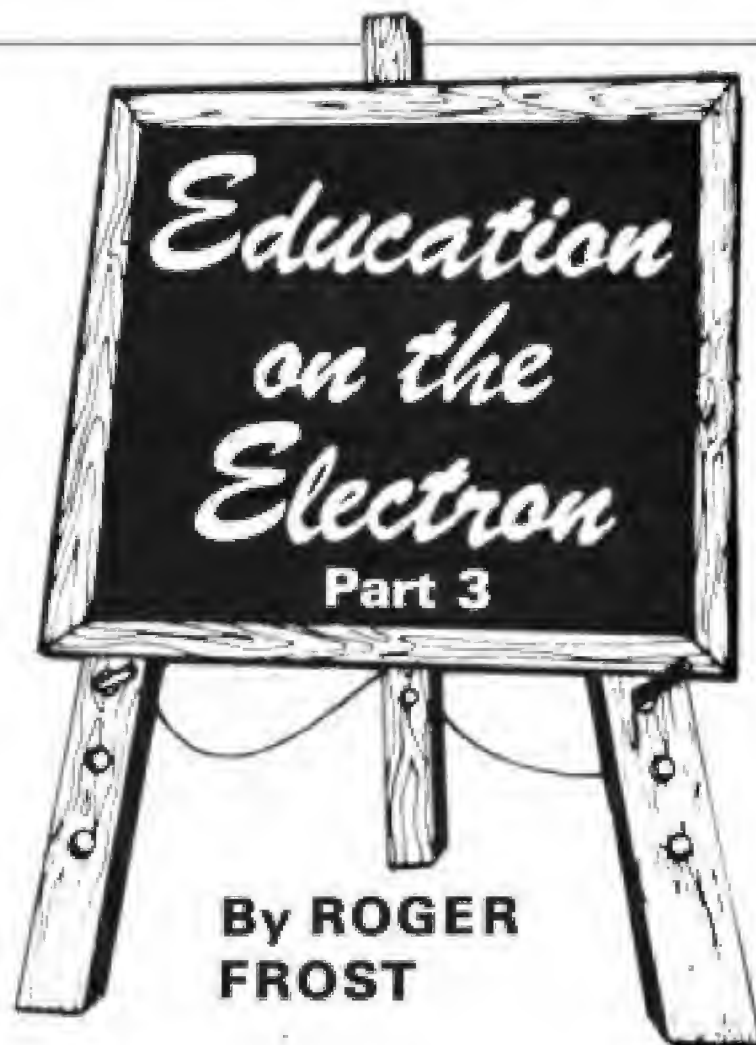
Another point to bear in mind is that many different reading schemes are used in schools. The wrong software could confuse a new reader.

Try to find out which system your child uses and if a particular program is suited.

For children who can read



Arcade games have value too... Acornsoft's Snapper is fairly easy to play and encourages good hand and eye coordination



By **ROGER FROST**

From Page 59

reasonably well text adventure games stand head and shoulders above all others as far as educational value is concerned.

A good adventure like a good book will encourage children to read, but as an extra, responses are required which need to be well thought out and correctly spelt.

While playing adventures a child is having to solve problems and if the program is well written the problems should be logical.

Adventures are usually so big that a child, or an adult, can't remember everything. This leads youngsters into realising that they will have to keep a record of where they have been and what they have found.

So adventures, which are usually thought of as games, will get youngsters reading, writing, recording in map or table form, problem solving and thinking logically.

If you can get more than one child to work on an adventure you get the added benefits of verbal reasoning and discussion.

That's not a bad cross section of the activities that go

on in a primary school.

Children aged from about five will be able to cope with the more simple adventures, but a friendly adult will probably need to be at hand to encourage them.

One of the best starter adventures is *The Magic Sword*, from Database Publications. This package starts with a picture story book which sets the scene.

The program, which extends the story, makes use of simple graphics and sound.

The text is straightforward and well thought out, and the responses required by players are kept to a minimum to avoid frustration.

A compass is permanently displayed and a game can be

Children aged eight and upwards may cope with adult adventures

saved to cassette for completion later. If you've got children under nine and want to get just one good program this is the one I would recommend.

There are, of course, other good adventures written with children in mind. Comsoft produces the excellent *Serpents Lair* and Tynesoft has released *Super Gran* for the Electron.

Children aged eight and upwards may cope with adult adventures, and graphic adventures such as *Repton* and *Citadel* will provide many of the same skills as text versions.

A quick look at *Merlin's Cave* will give you lots of other titles to choose from.

If you don't like the fantasy nature of adventures then you could follow the lead of many schools by using simulation programs.

In these children take on the role of a different person and have to cope with the problems of a totally different lifestyle.

Among the best of these is *Osprey*, from Bourne Educational Software where you take the part of a warden protecting a site containing osprey nests.

You have to decide how to allocate resources to ensure success for the ospreys, but also enjoyment for tourists in the area.

A program like this has many of the same educational points as an adventure, but will also induce children to consider the consequences of their decisions.

Once again, simulations are ideal for a team effort, so that ideas can be pooled and decisions thrashed out.

Many other simulations are

used in schools. They may have a historical or geographical flavour. They can have a sporting basis, such as *Football Manager*, or they can even use foreign language skills.

The content of such programs may be important, but it is secondary to the skills gained by children.

The computer allows a child to think of a possible course of action and then test it. That's something that often can't be done in reality because of cost and danger.

For instance in *Francis Drake* by LCL the problems of being a Tudor mariner can be explored.

As well as programs that might help the general education of your children there is plenty of subject-specific software.

There must be enough number programs to keep a budding Einstein busy just counting them. Most involve addition, subtraction, multiplication and division.

Another frequently covered subject is telling the time. Here Alligata's *Primary Time* is worth looking at.

Kosmos produces a neat Geography program and Chalksoft's *Note Invaders* will help with musical notation.

Make sure any program you buy has a fun element to it. If the program is dull it won't be willingly used.

That's just about it for educating under elevens on the Electron. Don't forget the word processors and databases, and remember that computers are just as much for girls as for boys.

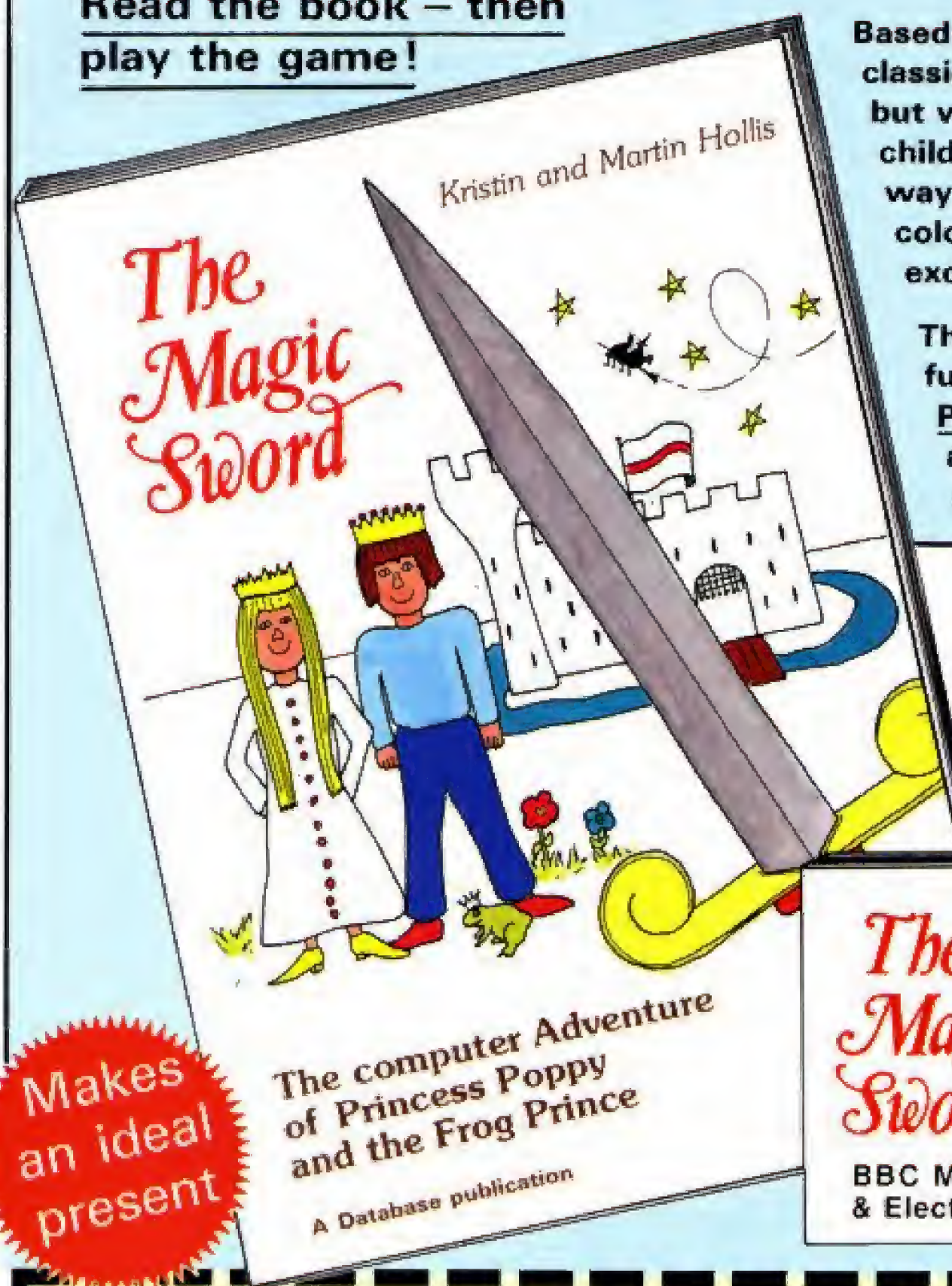
● Next time we'll consider the pros and cons of youngsters learning to write simple programs.



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Take the borrow down the lift into the many galleries of the mine, first to dig for diamonds and then for gold. Astute use of the lift and ladders and you might escape the monsters—or lead them to their destruction. Then go down for coal to re-fuel the furnace, which depletes as you use energy for the lift.

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HARLEQUIN

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This is the one that started it all—a real live 'Pacman' for the Electron. It is just like the original Arcade game with ghosties chasing you around as you devour, with all the facilities of the energisers which give limited time to zap the ghosties.

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Seven hectic levels with split screen and even double split screen make this very active indeed. The snake gets longer as the mushrooms are devoured, but avoid the toadstools at all costs. Ideal for young children, whilst by increasing the speed, active for adults and experts too.

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This Adventure has started countless people on adventures and provided a great deal of pleasure. The aim is to find and kill Count Dracula before he gets you. It is an ideal starter, needing plenty of effort to solve but not being too difficult to finish. Like all Kansas adventures, it is totally logical, which means things are always in the same place or where you leave them. Also like every Kansas adventure it has a game saving facility. And if you really get stuck, don't throw it away in disgust—give us a ring, for we operate a telephone Help! service!

RING OF TIME

Catalogue price £9.50

The sequel to Dracula, this is a little harder to solve, though still retaining all the features, including the split screen, which means the important information remains on the screen all the time. The object is to retrieve the elusive Ring of Time, going through many trials and tribulations.

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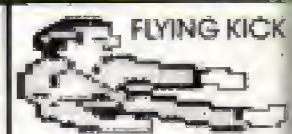
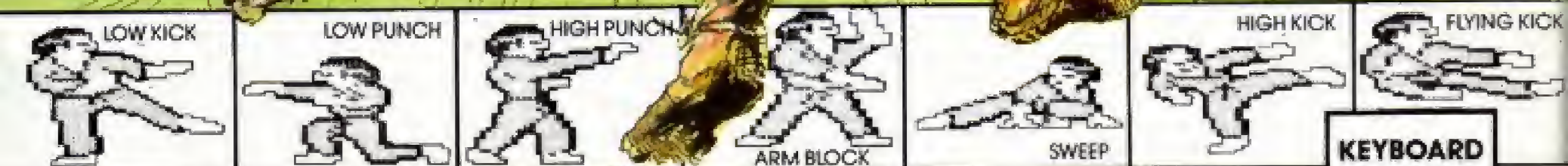
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